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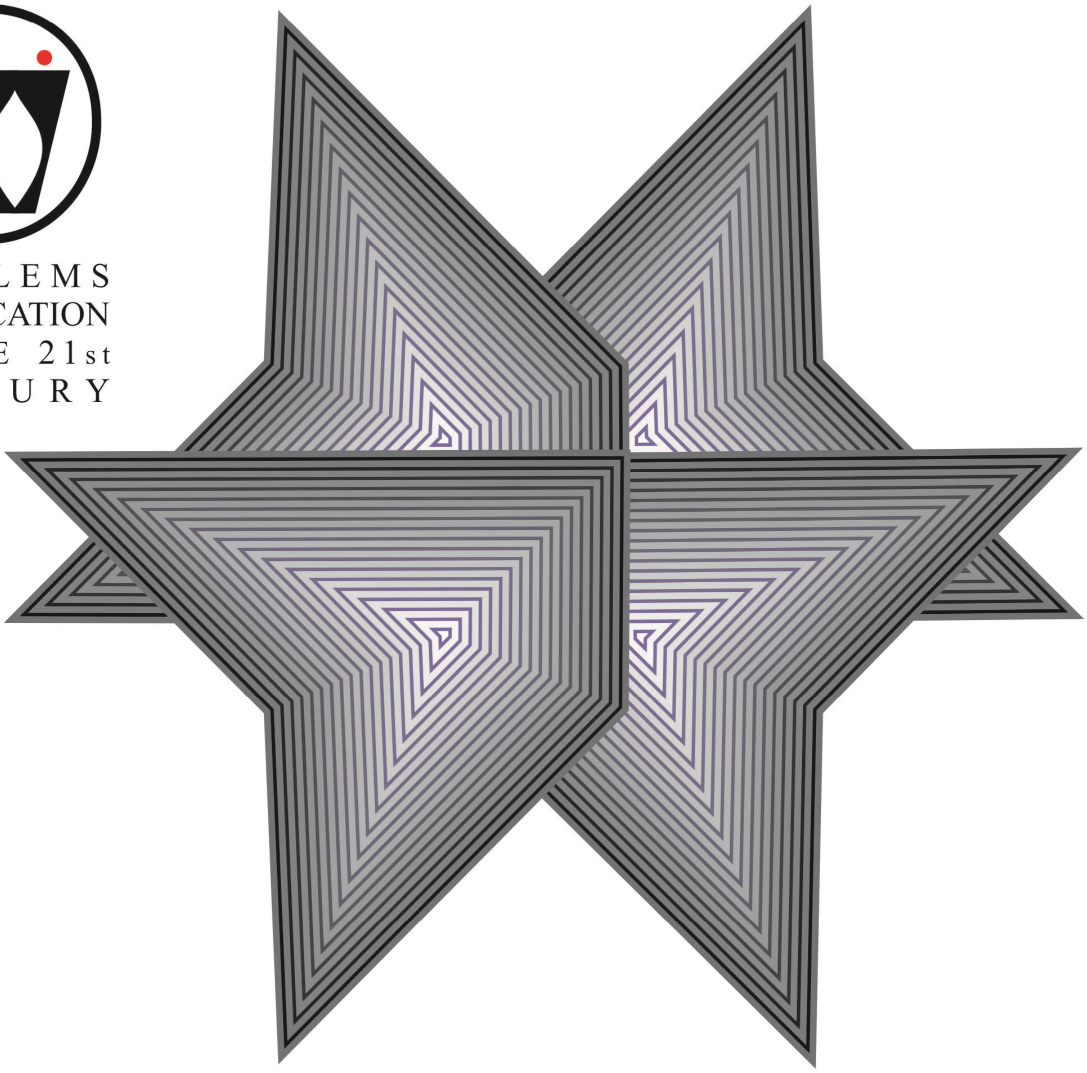

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PROBLEMS
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TREND OF EDUCATION RESEARCH IN PRE AND POST COVID19 PANDEMIC

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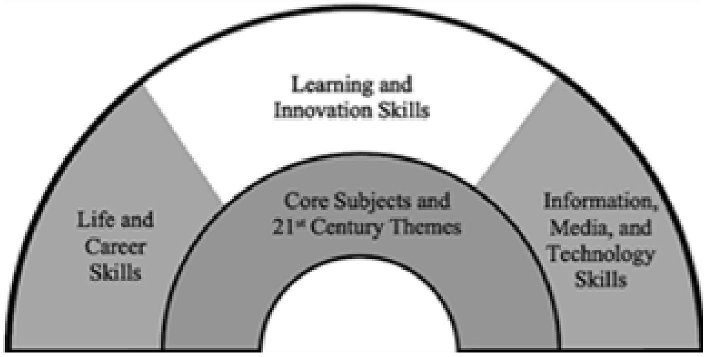
Education research trends are related to the style of types or their directions conditioned by social demand or the specificity of cultural changes at a given time and place (Potyrala, 2020). Accordingly, educational tendencies are of certain regularities with outlines in the development of ideas related to education and upbringing showing perspectives that can be predicted by describing models, planning research on future processes, as well as taking preventive measures. Before the turn of the century, the education research was delving on the evolution of traditional face-to-face education towards digital education with the advancement of the technologies in developing 21st century students coming from the alpha, Y and Z generations. Trilling and Fadel (2009) foresaw the 21st century student need learning traditionally school subjects with contemporary content themes to be combined with the 21st century skills. They developed the 21st century knowledge and skills rainbow (Figure 1) consisting of four domains, drawing the partnership of the traditional core subjects and the three 21st learning skills as additional themes: Life and Career Skills; Learning and Innovation skills and Information, Media and Technology skills. Education in the 21st century highlights globalization and internationalization (Boholano, 2017).

Figure 1
The 21st Century Knowledge-and-Skills Rainbow, (Trilling & Fadel, 2009, p. 48)


Learning and Innovation Skills
Life and Career Skills
Core Subjects and 21st Century Themes
Information, Media, and Technology Skills

The growth of blended learning (BL) is paced and technological, innovated with digital tools. BL integrates face to face teaching with web-based learning. Poon (2014) recognised that BL is likely to be developed as the leading teaching approach for the future as one of the top ten educational trends to occur in the 21st century. Despite BL is rapidly changing teaching and learning in higher education, it is not yet fully embedded and institutionalised in education either as an area of practice or a field of research (Smith & Hill, 2018).

Another area of concern is Environment Education (EE) as the climatic change has raised the emergency in the 21st century. Climate change models and long-term forecasts are hard for the public and policy makers to grasp, as they challenge intuition and short-term thinking since having a complex and slow temporal dimension (Manzanedo & Manning, 2020). Thus, a globally coordinated response to climate change is needed. Over time, the definition of EE

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has been transformed and has progressively extended its objectives towards the sustainability of development resulting in the approach of an environmental education for sustainability (EES), considering, above all, the new challenges of the 21st century (Gutiérrez et al., 2006). Salazar (2018) reiterated the definition of EE as the educational and cultural process through which subjects build knowledge and develop capacities, attitudes, and values that allow them to understand the environmental and socio-cultural reality to establish a responsible relationship with the environment and implement actions to address environmental problems. Researchers in this area believe that education institutions should provide EE and EES. UNESCO (2019) reasoned why EE has been fostered as a benchmark in the pedagogical and institutional field. There have been a lot of debate of how EE and EES can be integrated into the education curriculum at all levels. According to Gaudiano (1997) and dos Santos et al. (2020), it must also be transcended beyond classroom education and consider wider educational spaces where the subjects can influence and can also be influenced.

The unprecedented Covid19 pandemic declared in March 2020 by World Health Organization, created a global crisis establishing isolation and social distancing as a new global behavioural norm (Manzanedo & Manning, 2020). The pandemic crisis has affected all aspects of everyday life and work, and the global economy. The whole education ecosystem was disrupted with the entire shutdown process by May 2020 (United Nation report, 2020) into a remote emergency teaching and learning approach adopting virtual classroom platform with online educational tools reforming the entire traditional educational system. The crisis in fact paved the way for digital learning (Dhawan, 2020). There is a pressing need to innovate and implement alternative educational and assessment strategies (Pokhrel & Chhetri, 2021). Thus, the emergence in this field of research has been initiated by earlier pre Covid19 researchers' findings from studies on developing the E-learning tools and methods on teaching and learning. These studies were reviewed at the beginning of the discontinued face-to face teachings by others seeking for the alternative education system. The span of the Covid19 pandemic has created opportunities of novelty research as it has become increasingly exploratory and fertile for worldwide researchers. At earlier Covid19 age, research highlighted certain dearth such as the weakness of online teaching infrastructure, the limited exposure and readiness of teachers to online teaching, the information gap, non-conducive environment for learning at home, equity, and academic excellence in terms of higher education (Pokhrel & Chhertri, 2021). The disparity becomes obvious due to issues pertaining to a reliable internet connection and access and affordability to digital devices. Towards the later period, many researchers explored on psychological and mental distress in the teaching and learning community.

The transitioning of pandemic to endemic declared by some governments has seen a new normal in the education system with a generation of unfinished learning to get back on track. Dorn et al. (2021) used the term of unfinished learning which captures the reality that students not given the opportunity during the adverse age of the Covid19 to complete all the learning they would have in a typical year as students have disengaged from the education institution and slipped backward, losing knowledge or skills they once had. In addition, this also includes students moving on to the next grade unprepared having missed key building blocks of knowledge that are necessary for success which is not just academic knowledge, but social skills, behaviours, and mindsets to succeed in the learning environment or in the workforce. An accurate assessment of the depth and extent of unfinished learning will best enable to support students in catching up on the learning they missed and moving past the pandemic and into a successful future.

The pandemic has obviously shown there are other aspects of the teaching process to that of face-to-face traditional process. Many advantages and disadvantages, positive and negative aspects on E-learning are reviewed by Gherhes et al. (2021) which establish the premises for the implementation of future solutions regarding the didactic process, seen from a new perspective.

A complete return to face-to-face learning may no longer be entirely possible. A very pertinent question is as posed by Gherhes et al. (2021): *What will future education look like*? It must be acknowledged that Covid19 pandemic has accelerated E-learning regardless of whether the teachers and students/learners are ready or not. There is also clear evidence that the 21st Century Skills cannot be achieved entirely dependent on it. Blended learning or BL, one of the newest pedagogical concepts of the 21st century, combining face-to-face teaching with online teaching, thus creating a hybrid learning system, has been extensively studied by various researchers. Even before the pandemic, it has been stated hybrid system would offer the benefits of both education systems, some predicting that it could even be the "new normal" in the education of the future (Norberg, 2011). The case study mentioned by Potyrala (2017) that students perceive the presence of other people (friends) in their educational experience as an important part of this experience.

The education system decimated by pandemics showing the importance of prevention and early action offers important lessons for the global climate crisis despite the deep time lags of climatic dynamics (Manzanedo & Manning, 2020). The action now to prevent the worst potential consequences of the global climatic crisis that the present and future generations will almost certainly have to bear should draw that EE and EES have parallelism of action on the pandemics. Intensity of integration of EE and EES into the learning curriculum at all levels of formal education including research to address climatic change as a visible significant problem of the 21st century should therefore be heightened and implemented.

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ENHANCING STUDENTS' ATTITUDES TOWARD BIOLOGY USING CONSENSUS AND COOPERATIVE REFLECTIVE JOURNAL WRITING EDUCATIONAL STRATEGIES

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Abstract

Biology is a core and required science subject offered at the upper secondary school level in the Nigerian educational system. However, students' attitude towards the subject is poor, a trend probably due to the use of teacher-centred educational strategies. Scholars have thus advocated for the need to adopt innovative educational strategies to enhance students' attitude towards biology. This study investigated the use of consensus and cooperative reflective journal writing educational strategies in enhancing students' attitudes towards biology in two Local Government Areas (LGAs) within Ibadan Metropolis of Oyo State, Nigeria. The study adopted a quantitative pre-test-post-test, control group quasi-experimental design involving a 3x2 factorial matrix, with a positivist paradigm. Purposive sampling was used to select six schools across the LGAs while an intact class of upper secondary school II students was selected from each of the schools for a total of 305 participants. Two instruments, the Biology Attitude Questionnaire (BAQ) and the Students' Verbal Ability Test (SVAT) were used during the study. The data generated were analysed using the Analysis of Covariance (ANCOVA). Results showed that, treatments enhance students' attitudes toward biology. Results also revealed that students' verbal ability had effect on students' attitudes toward biology. The interaction between treatment and verbal ability was not significant to enhance students' attitudes toward biology. The two strategies, therefore, enhanced students' attitude towards Biology in the two LGAs within Ibadan metropolis of Oyo State, Nigeria. The two strategies should therefore be adopted in teaching Biology to upper secondary school students in Nigeria and elsewhere.

Keywords: *attitude toward biology, consensus strategy, cooperative strategy, reflective journal writing, verbal ability*

Introduction

Students' attitude is one of the most important secondary school learning outcomes. Its importance at this level is premised on the fact that career aspirations are formed at this level of education. Attitude is a construct of the affective domain and has received much attention from researchers in the last 40 years (Aiken & Aiken, 1969; Koballa & Crawley, 1985; Koballa, 1988) and is still continuing. Attitude occupies a central position that determines students' disposition towards a particular school subject. Students' attitude motivates them to pursue a particular course of study and continue in their efforts to attain a mastery level in the subject matter. Students' attitude towards a particular school subject is also reflected in the way they manage their perception and behaviour to the content being learnt. Thus, attitudes do not only

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facilitate learning, they are products of students' learning (Smith et al., 2012). Attitude may refer to the predisposition in responding in a way that is either favourable or unfavourable in relation to a certain attitude object (Oskamp & Schultz, 2005). This attitude object may range from things like biology, biologists, biology lessons, topics taught in school biology, inquiry-based biology laboratory experiments, biology education research, biological weapons, and biotechnology (Cheung, 2011).

Two important reasons were adduced for enhancing students' attitude towards science. First, attitude is linked with academic success. Researchers like Bennett, et al., (2001) and Salta and Tzougraki (2004) reported positive correlations between students' attitude and achievement in chemistry. Salta and Tzougraki (2004) reported that the correlation value between students' achievement in and attitude towards chemistry ranges from 0.24 to 0.41. Bennett et al., (2001) reported that the students with less positive attitude towards chemistry had low achievement score in the chemistry examination. Russell and Hollander (1975) also observed that there is a strong relationship between attitude and achievement, but a positive attitude cannot be inferred from achievement alone. They further reasoned that, there is a possibility for a student who has developed a more positive attitude towards a subject to achieve a low score in that subject and vice-versa. This means, attitude can influence achievement, but achievement may not have influence on attitude. As Stark and Gray (1999), submitted, if attitude is given utmost consideration, the much-anticipated change in cognitive domain may be achieved.

The other reason for developing students' positive attitude towards science is its ability to predict behaviours (Glasman & Albarracín, 2006; Kelly, 1988). According to Kelly (1998), the preference for biology, chemistry, or physics in schools by British students was predicated on their likeness for that particular subject. Despite receiving enough attention from researchers in the last 40 years or more, the importance of attitude has often been played down in comparison to achievement when it comes to measuring educational outcomes by the society, curriculum planners and teachers. As Stark and Gray (1999) stated, one of the major responsibilities of the science teachers is to develop students' positive attitude towards science subject. This is summarized by Mager (1968)

> *"The likelihood of the student putting his knowledge to use is influenced by his attitude for or against the subject. Things disliked have a way of being forgotten .... One objective toward which to strive is that of having the student leave your influence with as favourable an attitude toward your subject as possible. In this way you will help to maximize the possibility that he will remember what he has been taught and will willingly learn more about what he has been taught".*

Literature Review

Students' attitude towards a subject ought to be an essential concern during teaching and learning, and it is incumbent on teachers to note their students' attitudinal disposition towards their subject. For the teacher to achieve this, they must employ an effective pedagogy. According to Ebenezer and Zoller (1993), one of the variables that defines students' perceptions and invariably determines their attitude towards science courses in a science classroom is the educational strategy adopted by the teacher. Myers and Fouts (1992) stated, a classroom environment with varieties of strategies and unusual learning activities, couple with high level of students' involvement, personal support, and strong positive interaction among class members create/promote a strong positive attitude in the students towards science. This is corroborated by Koballa and Glynn (2007) when they stated that the "approaches to positively affecting student attitudes include instructions that emphasize active learning and the relevance of science to daily life" (p. 95).

There had been extensive research on students' attitude towards science, but only a handful research had been conducted on students' attitude on a particular subject like biology

(Hussaini, et al., 2015; Prokop et al., 2007; Shuaibu & Ishak, 2020; Usak, et al., 2009). "Studies on students' attitude towards Biology have evolved as a targeted area of study because researchers have demonstrated the role attitude plays in students' academic achievement", (Shuaibu & Ishak, 2020, p. 173). Borghans et al., (2008) stressed the need to effectively study students' attitude towards learning, because of its volatility compared to the cognitive abilities. This is because attitude is hard to form/develop, but once formed/developed, it becomes permanent.

An important variable that affects students' attitude towards biology is the quality of teaching adopted by the teacher in the classroom. There abound several research studies on the effects of varied educational strategies/pedagogy on students' attitudes, (Gibson & Chase, 2002; Wong et al., 1997). However, the conclusions from these studies are as varied as the studies themselves. The studies by Koballa and Glynn, (2007) and Shruba, (2008) concluded that the type of educational strategy students experienced in the classroom has an effect on their attitude towards the subject, but the study by Glynn et al., (2007) concluded otherwise. In order to contribute to the study on the effect of educational strategies in enhancing students' attitude towards biology, this study employed two modes of innovative collaborative educational strategies (consensus and cooperative reflective journal writings).

Studies on attitude using both forms of collaborative educational strategies are scarce in literature. Nevertheless, a few studies had been conducted on the effects of consensus and cooperative reflective journal writing educational strategies in enhancing students' attitude**.** Consensus is a form of collaborative learning. It is a decision-model to arrive at a unanimous decision agreeable to all after negotiation by individuals involved. It is a practice adopted by communities, organisation, and groups from prehistoric time (Schutt, 2001). The pillar upon which consensus is built is, the will of the people is paramount in any decision-making, and each and every individual's voice must be heard. In the classroom setting, the teacher decisions become a joint decision between the teacher and the students. This procedure ensures that authority and responsibility are shared between teacher and students in the classroom (Sartor & Young Brown, 2004). The benefit of the use of consensus is in its shaping of attitudes and opinions, and the enhancement rather than the evaluation (List, 2001).

Research literature grouped the consensus applied in classrooms into two model, the whole class consensus (Blinne, 2013; Mitchell et al., 2009; Sartor & Sutherland, 1992; Sartor & Young Brown, 2004) and consensus within groups (Inoue, 2010, MacDougall, 2013). The consensus educational strategy affords students the chance to discuss and co-construct the lesson formats together with the teacher. There are studies that have attempted applying this strategy in making educational decisions, however, just few of these studies categorically stated that the consensus process was adopted (Fetavero, 2017; Fetalvero & Bagarinao, 2017). They stated further that, the limitations of the findings of the benefits and effects of consensus and its variants to the confine of the investigator's classroom cast some doubts on the generalizability of the benefits of the strategy. This is because "there was never a structured and objective attempt to investigate and test the effects of the consensus process using a comparison group, particularly on students' attitude towards biology (Fetalvero & Bagarinao, 2017, p. 2).

Cooperative reflective journal writing educational strategy combines the features of both cooperative learning and reflective journal writing strategy. Cooperative reflective journal writing educational strategy allows students to learn and reflect together in a cooperative manner at the same time. Ige and Adu (2016) defined cooperative reflective journal writing as a strategy that involves students working cooperatively as they reflect on classroom tasks. It, therefore, means that cooperative reflective journal writing allows students to reflect cooperatively in the classroom as they learn together in a group. Arguably, cooperative learning is regarded as one of the most researched strategies of all educational strategies. It is a form of collaborative work that enables students to work together within a small group to maximise each other potential. It is a pedagogical approach that helps students to gain and create both academic and social relationships as well as to accomplish shared goals, (Johnson & Johnson, 2002; Lou et al., 1996; Slavin, 1996). Reflective journal writing on the other hand, facilitates increased and interdependent relationships among learners and the teacher (Chang, 2013).

According to Guvenç (2010), no research has been done on the effect of teaching methods supported with learning journal writing. The move to take advantage and study the effects of teaching methods combined with learning journals on students' learning outcomes prompted researchers like Güvenç (2010), Ige and Adu (2016) and Shih (2020) to combine cooperative learning and reflective journal writing educational strategies. This gives the students the opportunity to share and critique one another's idea(s). By so doing, a form of interdependent relationship is established among the group members, and the learners are able to take charge and the responsibility of their learning. According to Shih (2020), cooperative learning logs or journals provide the students a sense of belonging and fulfilment. This is due to the attention and the care each member displayed towards one another. The author concluded that, cooperative learning journal supports learners' affective domain (emotional aspect) and is beneficial in assisting their learning.

Besides the school factors like the teacher teaching style, there are also the individual factors, like the students' verbal ability that play part in affecting students' attitude towards a subject. Verbal prowess/ability is one of the greatest assets of human. It is the ability of human to express their feelings and/or thoughts through spoken or written words. "It refers to the level of students' language development as evidenced by their oral or written communication skills which they need to properly convey their opinions and feelings after reading a text" (Ezenandu, 2012, p. 15). According to Nwosu (2002) and Odiaka (2002), it is an individual level of intelligence or language development and the ability to reason abstractly. In science, verbal ability can assist an individual in explaining an experimental outcome and the conclusion derives from such (Gluck et al., 2015). They stated further that since, reasoning ability is very important and scientific knowledge been not static, verbal abilities enable individual to argue and defend their discovery or position objectively.

Biology as a science subject requires verbal skills as students are expected to understand and interpret concepts, spell correctly relevant terminologies, give detailed explanations, and analyse their answers. These skills enable the students to communicate within themselves and with the teacher, express their feelings, share ideas as well as learning from each other. Students with difficulty of expression either with the teacher or peer will likely experience conflictual relationship, while students adept at expressing themselves tend to develop close relationships with teachers and peers (Rudasill et al., 2006). Also, verbal skills are important in navigating classroom social processes like turn-taking, collaboration and demands compliance (Brocks et al., 2018). Individuals with a smaller or limited vocabulary may face/experience a lot of frustration due to inability to fully express themselves. This leads to difficulty in building relationships as they are less able to organise their thoughts or decipher what is expected of them by others (Monopoli & Kingston, 2012; Stansbury & Zimmerman, 1999). The presence or absence of these skills will impact students' disposition or attitude in the classroom. Despite the fact that verbal ability has an effect on students' learning outcomes in science in general and biology in particular, it has not received much attention from researchers.

Research Problem

The issue of students' poor attitude towards science has been a source of concerns of science researchers for a while. The Dainton (Department of Education Science (DES)) report in the United Kingdom in 1968 documented students' decline interest in science and called it "swing from science". Students decline interest in science is sweeping across countries in both Global North and South. A factor identified to have contributed to students' decline interest in science is the teaching style adopted by the teacher for the teaching and learning of science. The traditional mode of classroom teaching and learning of transmitting knowledge without taking the students' interest into consideration might have contributed to students' decline in science over the years. In order to stimulate students' interest in science, schools are now changing to learner-centred education which encompasses methods of teaching that shifts the focus of teaching and learning from the teacher to the student. This study, therefore, investigated the effect of consensus and cooperative reflective journal writing educational strategies, with the moderating effect of verbal ability on students' attitude towards biology.

Hypotheses

- There was no significant main effect of treatments on students' attitude towards biology
- There was no significant main effect of verbal ability on students' attitude towards biology
- There was no significant interaction effect of treatments and verbal ability on students' attitude towards biology

Research Methodology

General Background

This study adopted a quantitative pre-test-post-test, control group quasi-experimental design involving a 3x2 factorial design. This design was employed because the participants were from intact classes in a natural school setting where random assignment was not possible, and the distraction of class structure was avoided to the minimum. The treatment was the educational strategies at three levels (consensus, cooperative reflective journal writing and conventional strategy). The moderator variable was verbal ability at two levels (low and high). Students' attitude towards biology was the dependent variable.

Sample

The targeted population for this study were the upper secondary school two students in Ibadan metropolis, Oyo State, Nigeria. A multistage sampling technique was used to select 305 (124 male and 181 female) from a total of 1,483 students for the study. At the first stage of sampling two local governments were randomly selected out of the 5 local governments within the metropolis. At the second stage, three coeducational schools that were distantly located were purposively selected in each of the local government areas to make a total of six schools. This was done in order to avoid or minimise experimental contamination. In all the schools, intact classes were used. The criteria for purposive sampling included; the schools were public funded, the schools must have been presenting students for external examinations in the last five years and participating teachers' had a minimum of bachelor's degree.

Research Instruments

The study's data were collected using the following instruments:

- Biology Attitude Questionnaire (BAQ)
- Students' Verbal Ability Test (SVAT)
- Teacher's Guide on Consensus Educational Strategy (TIGCES)
- Teacher's Guide on Cooperatively Reflective Journal Writing Educational Strategy (TIGCRJWES)
- Teacher's Guide on Conventional Strategy (TGCS)

Biology Attitude Questionnaire

The Biology Attitude Questionnaire (BAQ) adopted and modified for the purpose of this study was from Russell and Hollander (1975): A Biology Attitude Scale. BAQ was designed to look into or test: (i) the students' affective domain in relation to the two strategies, (ii) the development of sense of responsibility in providing urgent solutions to biological concepts. It consisted of 21 items and was placed on a 4-point Likert type interval scale ranging from Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). The scale was not intended to measure absolute attitude toward biology but was designed to detect and measure changes in attitude toward biology. Hence the scale was designed to be used at the beginning and the end of treatment. The item contained an almost equal number of positive and negative items reflecting certain attitudinal disposition to Biology.

In order to determine the face validity, the items were shown to some science educators with bias in Biology for its appropriateness in terms of clarity of ideas, language of presentation, class levels, coverage, relevance and application to the study. The reliability coefficient of the instrument as measured by Russell and Hollander averaged .90. For the purpose of this study, the reliability coefficient was determined using Cronbach alpha measure and it yielded .861**.**

Cronbach alpha was used because it is assumed that each test item measures the same latent trait on the scale.

Students' Verbal Ability Test (SVAT)

Students' Verbal Ability Test (SVAT) was adapted from the Australian Council for Educational Research (ACER) to assess students' verbal ability. It has gone through several modification and revalidation for use by some Nigerian authors (Aimunmondion, 2008; Awofala et al., 2011; Ezenandu, 2012; Fakeye 2006; Ige & Adu, 2016; Maduabuchi, 2002; Olaboopo, 1999) since its first introduction into Nigerian education system by Obemeata in 1974. However, the researchers re-validated the test to ascertain its suitability for this study. The SVAT was trial-tested on 20 upper secondary school II students in a school that was not chosen for the main study. The collected data was analysed using Kuder-Richardson formula 20 (Kr20) and a reliability of .78 was obtained. Kr20 was used because of the inequality of the difficulty level of the items in the SVAT. The SVAT was administered on the participants once before the treatment began.

Teachers' Guides

Teachers' Guide on Consensus Educational Strategy (TGCES), Teachers' Guide on Cooperative Reflective Journal Writing Educational Strategy (TGCRJWES) and Teachers' Guide on conventional method (TGCS) are the lesson notes, which were prepared weekly for the six weeks of the treatment for the study. The duration for each lesson was 80 minutes (double periods). The essence of these instruments was to guide the research assistants (teachers) on the use of steps and procedure followed during the treatment.

Procedure

The following procedure was used to carry out the treatment: The first week of the study was spent training the research assistants (classroom instructors), and the second week was spent administering the pre-tests.

The 80-minute sessions were used for a total of six weeks of treatment. In the final week of the trial, all groups were given a post-test.

Data Analysis

The post-test attitude scores were subjected to a two-way analysis of covariance (ANCOVA) using the pre-test scores as covariates. Analysis of covariance is used to test the main and interaction effects of categorical variables on a continuous dependent variable, controlling for the effects of selected other continuous variables, which co-vary with the dependent. The control variables are called the "covariates". It's also used to control for factors which cannot be randomized but which can be measured on an interval scale in experimental designs. The ANCOVA reduces experiment error by statistical rather than by experimental procedure (Coolican, 1994). The Bonferroni post-hoc test was used to determine which of the groups causes the significant main effect, while the interaction effect was explained by the aid of a graph. The Bonferroni post-hoc test was employed in order to be certain that the treatments (consensus and cooperative reflective journal writing) strategies have a positive effect on students' attitude in comparison to the conventional mode of teaching.

Research Results

Hypothesis 1: There was no significant main effect of treatments on students' attitude towards biology. The summary of this result is given in Table 1

Table 1
Analysis of Covariance (ANCOVA) of Post-Attitude by Treatment and Verbal ability

Source	Type III Sum of Squares	*df*	*MS*	*F*	*p*	η^2
Corrected Model	9410.598	6	1568.433	103.294	p<.001	0.675
Intercept	2124.414	1	2124.414	139.910	p<.001	0.319
Pre-Attitude	8461.791	1	8461.791	557.279	.001	0.652
Treatment	98.040	2	49.020	3.228	.041*	0.021
Verbal ability	1045.855	1	1045.855	68.878	.000*	0.188
Treatment x Verbal ability	38.367	2	19.184	1.263	.284	0.008
Error	4524.864	298	15.184			
Total	1493493.000	305				
Corrected Total	13935.462	304				

R Squared = .68 (Adjusted R Squared = .67) **denotes significant p<.05*

Table 1 reveals that there was a significant main effect of treatments on students' attitude to biology ($F_{(2, 304)} = 3.23$; $p<.05$, partial η^2 =0 .02). The effect size, 20.0% showed a small effect size. Nevertheless, it showed that there was a statistical difference among students in the treatment groups from the conventional group. Therefore, hypothesis 1a was rejected. In order to explore the magnitude of the significant main effect across treatment groups, the estimated marginal means of the treatment groups were carried out and the result is presented in Table 2.

Table 2
Estimated Marginal Means for Post-Attitude by Treatment and Control group

Treatment	*M*	*SE*	95% C.I for difference	
			Lower	*Upper*
CES	68.33	0.53	67.31	69.35
CRJWES	70.44	1.00	68.47	72.40
CS	67.63	0.50	66.65	68.61

Table 2 reveals that students in the CRJWES treatment group 2 had the highest adjusted mean score in their post-attitude to biology (70.44) followed by those in the CES treatment group 1 (68.33) and their counterparts in the CS control group (67.63). The Bonferroni post-hoc test was used to identify which of the groups was responsible for the significant main effect of treatment on students' attitudes to biology, and the results are shown in Table 3.

Table 3
Bonferroni Post-hoc Analysis of Post-Attitude by Treatment and Control Group

(i) Treatment	(j) Treatment	*M Diff (i-j)*	*SE*	*p*	95% C.I for difference	
					Lower	*Upper*
CES	CRJWES	-2.11	1.13	.188	-4.82	.61
	CS	.70	.72	.997	-1.03	2.43
CRJWES	CES	2.11	1.13	.188	-.61	4.82
	CS	2.81*	1.11	.036	.14	5.47
CS	CES	-.70	.72	.997	-2.43	1.03
	CRJWES	-2.81*	1.11	.036	-5.47	-.14

Table 3 indicated that the post-attitude mean scores in biology of students in CRJWES significantly differ from those taught with the CES and those exposed to CS. Table 3 further showed that there was no significant difference in the post-attitude mean scores of students exposed to CES and their counterparts in the CS. This suggests that the ANCOVA result revealed a significant difference not between the treatment groups (CRJWES and CES), but between the CRJWES and the control group, as evidenced by students' post-attitude scores in biology.

Hypothesis 2: There was no significant main effect of verbal ability on students' attitude to Biology

Table 1 reveals that there was a significant main effect of verbal ability on students' post-test attitude scores in biology ($F_{(1, 304)} = 68.88$; $p<.05$, partial $\eta^2 = 0.19$), according to the results of the analysis of covariance. The effect size 19.0%, showed a small effect size. Hypothesis 2 was therefore rejected. This implies that verbal ability has a main significant effect on students' attitude to Biology irrespective of their treatment status.

Table 4

Estimated Marginal Means for Post-Attitude by Verbal ability

Verbal ability	*M*	*SE*	95% C.I for difference	
			Lower	Upper
Low	65.28	0.75	63.81	66.76
High	72.32	0.37	71.59	73.04

Table 4 shows that students with high verbal ability had a higher adjusted mean score in the post-attitude score in biology (72.32) than students with low verbal ability (65.28). This means that students with high verbal abilities have a more positive attitude toward biology than students with low verbal abilities, and this difference was significant.

Hypothesis 3: There was no significant interaction effect of treatments and verbal ability on students' attitude to biology.

The interaction effect of treatment and verbal ability on students' attitudes toward biology was not significant ($F_{(2, 304)} = 1.26$, $p>.05$; partial $\eta^2 = 0.01$), as shown in Table 1. As a result, hypothesis 3 was not rejected. This suggests that the interaction between treatment and verbal ability did not jointly enhance students' attitude towards Biology.

Discussion

The study was on the effects of consensus and cooperative reflective journal writing educational strategies on students' attitude towards biology. The study's findings revealed that students in the experimental or treatment groups had a more positive attitude toward biology than students in the control group, although, the attitudes of students in the consensus group and those in the control group were not significantly different. Despite this, it seems to have the potential to enhance students' attitudes toward biology. This conclusion was consistent with Fetalvero and Bagarinao (2017), who stated that while the general attitude toward biology was significant, it was not enough to conclude a significant difference between students exposed to the consensus strategy and those exposed to the conventional strategy. This was due to the fact that only three of the seven components of attitude measured by the Attitude Towards Biology Scale (ATBS) showed significant differences (perception of the biology teacher, eagerness to learn biology, and enjoyment of biology), while the other four components showed no significant differences (importance of biology, interest in biology lessons, anxiety towards biology and effort in learning biology). They argued that the lack of significance could be related to the study's short duration and the strategy's novelty. Consensus strategy, however, has the potential to improve students' attitudes toward biology since it assures inclusivity, cooperation, collaboration, maximization of agreement, relationship building, and respect for all points of view (Hartnett, 2012).

The attitude of students in the cooperative reflective journal writing strategy significantly differs from those in the conventional strategy. This result is consistent with the findings of Güvenç (2010), in which students expressed positive satisfactory feelings ($f=76$) compared to ($f=34$) expressing negative satisfactory feelings after conducting a content analysis of students' opinions on the satisfaction derived from learning journals combined with cooperative strategy. This may be attributed to the fact that as students learn in group, they reflect and share opinions together and influencing one another by so doing.

According to the findings, the two educational strategies increased social interaction among students and between students and teachers, consequently improving students' attitudes toward biology. The strategies create a calm environment in the classroom, allowing students to communicate more effectively. They place individual responsibility for learning in the hands of each and every student in the classroom. Students developed a good mindset as a result of this. Individuals' shame and guilt are reduced as a result of this social interaction, and students have a more positive attitude while studying.

There was a significant main effect of verbal ability on students' attitude towards biology. The students with high verbal ability portray more positive attitude to biology compared to the low verbal ability students. This result echoes the findings of Fola-Adebayo (2014) and Tzu-Ling Wang (2008) who reported that students' verbal ability improved students' attitude to science and reading respectively. Their report indicates that the high verbal ability students professed more positive attitude compared to the low verbal ability students. The result of this study is however not in consonance with the result of Ezenandu (2012) and Okere (2019) who both reported that verbal ability had no effect on students' attitude to Literature-in-English.

According to the findings, high verbal ability students, regardless of their group, have a positive attitude about biology, whereas low verbal ability students have a negative attitude toward biology. Low verbal ability students may have developed a negative attitude as a result of their poor language dexterity and inability to express oneself clearly. High verbal ability students, on the other hand, were able to smoothly express themselves due to their strong command of the language, resulting in a positive attitude toward biology.

There was no significant interaction effect of treatment and verbal ability on students' attitude to biology. Treatments and verbal ability do not interact to affect students' attitude towards biology. This implied that given equal opportunities, students with high and low verbal ability would have the same attitude towards biology. This study agreed with the report from the study of Ezenandu (2012) and Fola-Adebayo (2014) who found no significant interaction effects of treatments and verbal ability on students' attitude to English prose literature and reading respectively.

The findings revealed that when students have equal access to quality language programmes, they will approach biology with the same attitude. This will reduce the difference between students with high and low verbal abilities, as well as their attitudes toward biology. Some inherent shortcomings of the strategies if not properly handled in the classroom is that it could lead to loss of focus of the discussion at hand, the high verbal ability students could hijack and dominate the class discussion at the expense of the low ability students, which could lead to negative attitude towards biology by some students.

Conclusion and Implications

This study established empirically that the use of students' centred educational strategies is capable of enhancing attitudes to Biology. The study showed that consensus and cooperative reflective journal writing were both effective in enhancing students' attitude towards biology than the conventional strategy. Although, students in the cooperative reflective journal writing educational strategy group showed more positive attitude than those in the consensus strategy, nevertheless, both strategies showed the potential in contributing to enhancing students' attitude towards biology. Students' verbal ability also played a role in enhancing students' attitude towards biology as the students need to constantly dialogue among themselves and with the teacher as the case may be. Those with high verbal ability are able to express their feelings and receive feedbacks from peers and teacher unlike those with low verbal ability that found it difficult to communicate their feeling to peers and teachers, thereby not receiving feedbacks, which invariably affected negatively their attitudes towards Biology subject. Treatments and verbal ability do not combine to enhance students' attitude towards biology. Based on the findings from this study, the following recommendations were made:

- Teachers should be encouraged to incorporate the use of consensus and cooperative reflective journal writing educational strategies as they showed the potential of enhancing students' attitude towards Biology.
- Teachers should endeavour to encourage development of students' verbal proficiency by engaging them in regular reading activities.

Declaration of Interest

Authors declare no competing interest.

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STUDY AS AN EDUCATIONAL LEISURE ACTIVITY: THE CASE OF ISRAELI SOCIETY

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Abstract

The research literature on leisure indicates that it is perceived differently by sector and culture. In Israel, one's affiliation with religious or non-religious groups affects one's perception of leisure and its legitimacy. The common activities of religious and secular people include studies in general, and Torah study in particular, as activities carried out by choice and for pleasure. In this research Torah study is considered in its wide meaning, as including all traditional Jewish texts. The research sought to try and understand various characteristics of people who study Torah as a leisure activity and to illuminate aspects rarely addressed in the academic literature, mainly students' perception of study efforts, importance of studies, the contribution of studies and satisfaction with studies. The sample included 234 respondents divided into three groups: Torah students (56) who were studying in a hevruta (collaborative) format, Torah students (50) who were studying a course by participating in lectures, and a control group (128) who were studying other theoretical topics by participating in lectures. The findings of this research indicate that Torah study nowadays takes place not only as an obligation but rather also as an elective activity in formal courses and hevruta study groups – an activity that transcends the religious dimension and involves a choice and pleasure for all learners. Additionally, Torah students perceived their studies as having greater contribution, more important and more satisfying than students of non-Torah subjects. The method of study (collaborative vs lectures) did not affect these perceptions. The findings may have applied implications beneficial to society in general. The research findings illuminate the potential of Torah study as a leisure activity and its capacity to unite various sectors in Israeli society.

Keywords: *leisure activity, culture, religious, Israeli society, Torah study*

Introduction

The research literature on leisure indicates transformations in the perception of Torah study from that of a religious activity with sacred dimensions to one that sees Torah study as a shaper of leisure culture in the various streams within Jewish society (Davidovitch & Lazar, 2017). Torah study is not merely an obligatory activity, the worship of God, rather also a diverse leisure activity engaged in by choice, which takes place also beyond the obligatory practice in places of prayer and study halls, places of holiness. Many researchers have referred to the different definitions of leisure: as time, as activity, as a mental state of mind, and as a value. Moreover, researchers related to the perception of leisure in traditional-religious society versus the attitude to leisure in modern society (Davidovitch, 2016; Soen & Rabinovich, 2011).

In Israel, to a certain degree, religious affiliation determines people's cultural inclinations in general and their perception of leisure in particular (Davidovitch, 2019). With regard to the role of Torah study in Jewish culture, it is evident that while over the generations Jewish culture sanctified Torah study and particularly the discourse between man and God (Davidovitch, 2016), at present Torah study serves in practice more as a leisure activity that is part of one's social activities and is engaged in by choice. Hence, significant changes have occurred, facilitating

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the introduction of innovation and shifts in the perception of Torah study as a leisure activity (Layosh, 2015).

Torah study occurs not only in synagogues, which are in essence a place of prayer, a place of thrice daily religious ritual, a place of Torah lessons, of rabbinical sermons. In addition, Torah study in the synagogue unites people in a congregation, such as on holidays, Rosh Hodesh, and special Sabbaths, while also enabling interpersonal encounters as part of gatherings that occur not only on Mondays and Thursdays and Sabbaths – the days on which the Torah is traditionally read (Layosh, 2015). In fact, Torah study as an extra-curricular activity takes place on all days of the year, it is a type of club with designated contents, one that includes refreshments, a dress code, language, and behavior norms that encompass something of the current relevant social discourse.

In the community that defines itself secular as well, changes have occurred in the perception of Torah study. In recent years it is possible to see that more secular people participate in study activities as part of the preservation of Jewish tradition (Azulay, 2010). Hence, the current study will focus on the perception of Torah study as a leisure activity that does not necessarily take place in a synagogue. In Israel, in the last decade, accelerated developments are evident concerning leisure activities in diverse populations. The individual is confronted with a wide spectrum of many different unique leisure activities. Among these activities, studies in general and Torah study in particular have become an activity engaged in by choice and enjoyably (Azulay, 2010; Ben David, 2016; Sheleg, 2010).

The current study relates to Torah study in its wide meaning, including the constitutive Jewish texts. The study aims to examine the differences in the perception of Torah study as leisure activity among Israeli men and women, secular and religious, who choose to study Torah as part of their leisure activities. Study is an educational leisure value and activity in the Israeli society. This study will explore the association between the characteristics of leisure in the research literature and those of Torah study, in the aim of examining Torah study as a leisure activity (Davidovitch & Soen, 2016).

Leisure is gradually occupying a significant place in human life. Many studies have been written on the association between quality of life and leisure (Nehushtan, 1980) and on the contribution of leisure activities to one's quality of life (Grant & Kluge, 2012; Heintzman & Patriquin, 2012; Mannell & Snelgrove, 2012). Many researchers have related to the various definitions of leisure: as time, as activity, as a state of mind, and as a value (Davidovitch & Soen, 2016; Katz-Gerro, Raz et al., 2009; Soen & Rabinovich, 2011).

In recent years, people have more leisure time and can choose how to fill it. Western culture includes a wealth of leisure activities (Hayush, 2018; Passmore & French, 2003). Some researchers relate to leisure as a significant resource in one's life (Davidovitch & Soen, 2016; Weber, 2010).

Culture affects the type of leisure customary in a certain society (Weber, 2010). In Israeli society, leisure is receiving gradually more legitimization. During the 70 years since independence a change has occurred, from a society that sanctifies labor – to a society that sanctifies leisure as a value. The existential exigencies have changed, and the new generations have been raised into a reality of a society of abundance. This is true of other cultures, where labor is perceived as a means of reaching an aim – and the aim is leisure. It is evident that leisure is culture dependent. This is manifested mainly in the amount of time devoted to leisure, the type of activities, and the level of activity (Katz-Gerro et al., 2009; Soen & Rabinovich, 2011). Where in the past studies showed that Israelis have a long workday, recently it is evident from the research that Israelis devote the same amount of time to work and leisure. Leisure activity is characterized as voluntary rather than an obligation. In addition, it is characterized by pleasure and reflects one's personal motivation (Passmore & French, 2003). Israel is defined as a developed country from a cultural respect (Aguiar & Hurst, 2007; Csikszentmihalyi & LeFevre, 1989; Delle Fave & Massimini, 1988). This is evident in the wide array of leisure activities that constitute a resource for one's quality of life (Hsieh et al., 2004). From among the wide range of possible leisure activities, the current study will focus on Torah study. Studies (Passmore & French, 2003) indicate that the engagement with studying as a leisure activity is an opportunity for learning and acquiring knowledge and skills, personal growth, and improving self-efficacy. Additionally, it has been suggested that leisure activities are essential for one's health and for improving one's quality of life (Hsieh et al., 2004).

The association between leisure and quality of life has been under investigation for years. All the studies on the benefits of leisure or the rewards of leisure found a positive association between participation in leisure activities and quality of life (Grant & Kluge, 2012; Heintzman & Patriquin, 2012; Mannell & Snelgrove, 202). In addition, leisure activities were found to enhance one's self- esteem. Leisure activities have also been found to reduce the impact of negative life events (self-protection) (Kleiber et al., 2002). These findings point to leisure and studying as settings for acquiring resources that contribute to one's quality of life.

As early as 1953, Nash, similar to Newman and colleagues (2014), contended that leisure activity causes satisfaction and pleasure. He classified various activities in leisure culture as positive and negative activities. Positive activities include active participation in a group and/or participation that activates the mind. Hence, there is a hierarchy in the choice of leisure activities; the most positive activities are those that generate a pleasurable, enjoyable emotional reaction accompanied by involvement and satisfaction (Mundy & Odum, 1979).

In order to explore the significance of Torah study, the efforts invested in it and its contribution to the learners' satisfaction with studies, the present research compared a group of people who study Torah and a control group of people who study other theoretical contents in the same setting. The Torah students group too was divided in two: a group studying a course and attending lectures and a group studying in a *hevruta* (collaborative) form. This division of the Torah students was done in order to explore the possible effects of different methods of Torah study.

Leisure culture and Jewish culture

The exposure of Jews to leisure culture began mainly during the rule of the Roman Empire. At that time, Jews considered leisure activities and the leisure culture to be impure, a despicable abomination, and kept their distance from them, although this was one of the many influences of Roman culture, which was a big and strong culture that left a mark even many years after its decline. In this period there were various leisure activities such as public games, theatre, and performances, perceived by local Jews as pagan ceremonies. The assumption of the historians is that in this period Jews did not participate in the games and performances. Some say that attending the performances was forbidden for the Jewish community at that time (Davidovitch, 2019). Analysis of talmudic sources indicates that the simple people did visit contemporary places of entertainment (Davidovitch, 2019), although the negative views of the rabbinical leaders, as well as their perception of leisure and revulsion at it, are evident from the talmudic literature.

Consistent with the sources and with Tractate Avot, Rabi Frankel (1981) determined that an exemplary Jewish figure is one who has no leisure time. Leisure is understood as a waste of time that could be utilized for Torah study, as one is instructed to labor in Torah, to sit and study Torah, whenever he has spare time. Judaism guides all one's ways, including with regard to leisure. Halachically, one should not waste time and every moment should be filled with content. Contemporary culture breached these boundaries as well and has reached the observant public, such that it is possible to see observant people reading books, newspapers, watching movies, going on outings, etc. Nevertheless, it is evident that being religious mostly causes people to avoid permissive forms of entertainment (Ne'eman, 2008) and there is an attempt to combine modern leisure with traditional Torah-based contents, the new with the old.

Jewish tradition was found to have had a great influence on Jewish culture and on Israeli culture. Jewish tradition relates to leisure as something inconsequential, secondary, with no inherent value. According to the Jewish perspective, one's time is sacred for Torah study and leisure does not have equal value to that of Torah study (Davidovitch, 2016).

This is true of Israel too, in its first years, when the value of labor was supreme, and leisure was a means of expressing the loftiness of the value of labor. In this period, songs were written about labor and work and books praised war and warriors.

Notably, there are differences between various Jewish groups with regard to their perception of the world in general and of cultural and artistic activities (Davidovitch, 2019). Religious affiliation has been found to determine people's cultural affiliation and belonging to a group or sub-group that leads to the shaping of the individual, as a common world view and point of origin are formed within the group. With regard to leisure, for example, Davidovitch (2019) explains that the group can affect how its members perceive poetry, theatre, cinema, or engaging in sculpture and music.

Hence, although throughout history Jewish culture sanctified mainly Torah study (Davidovitch, 2016), in practice the synagogue also served as a leisure activity, as it was a means of enhancing people's unity and communality. At present in Israel, Jewish society is very different than historically. Observant Jews are divided into groups, with the main ones being the ultra-orthodox and the national religious, which differ and contain different subgroups. Both the ultra-orthodox and the national religious observe the religious precepts and live a life guided by Jewish law, but the national religious are conscious of combining this with modern life and contemporary culture. In addition, among the ultra-orthodox and ultra-orthodox women, significant changes are occurring with regard to leisure culture, enabling the entrance of innovations and transitions (Layosh, 2015). Hence, among different groups and sub-groups, various cultural activities are emerging (Katz-Gerro et al., 2009). Namely, precisely due to the difference between the secular and religious culture, different cultures will emerge among religious teens, for instance, than among secular teens.

In summary, leisure culture within the Jewish community has undergone changes over the years, where at present there are groups that encourage a combination of life guided by Jewish law with contemporary culture that encourages a leisure culture (Ne'eman, 2008).

Torah Study as a Leisure Activity

Studies indicate that the population of Torah students in Israel has changed over the last decades, with a process of diversification. One of the developments that indicate the change that occurred in the population of leisure learners is that in addition to men, women too are studying Torah. In recent years this topic has been a focus of research attention (Bar-El, 2009; Brown (Hoizman), 1996; Elor, 1998; Halivni, 1997; Ross, 2007). Moreover, a change is evident in the motivation underlying studies (Ben David, 2016; Sheleg, 2010). At present, not only religious people study Torah as a religious precept, guided by the saying "And the study of the torah is equal to them all" (Mishna, Tractate Peah 1:1), but rather a wider and more diverse public is studying Torah by choice as a leisure activity, integrating interest, pleasure, inspiration, uplifting, and enrichment (Davidovitch & Soen, 2016). Studies show that the groups are diverse and characterized by a different "profile" of learners than in the past (Azulay, 2010; Ben David, 2016; Sheleg, 2010). The "new" groups constitute a diverse sociocultural cross-section (Bhabha, 2002).

It is said that since the murder of Prime Minister Rabin, due to the fracturing and trauma experienced by Israeli society, a "revolution of Jewish renewal" is emerging (Bhabha, 2002;

Sheleg, 2010), one that crosses sectors and genders, embracing traditional and other contents and study methods. This Jewish renewal (Ben David, 2016; Sheleg, 2010) is manifested among other things in the domain of Torah study, with a different time and place, teachers and students, nature of discourse and study methods.

This renewal encompasses a breach of the stigma whereupon studies necessarily take place in a "Yeshiva", i.e., a Jewish institution for Torah study (Shenhav, 2001). The change is evident in the establishment of pluralist batei midrash (study centers) where Torah is learned as a leisure activity, such as Elul, Kolot, Alma, Bina, and an umbrella organization called Panim, which unites 60 organizations engaged in studying Jewish Israeli culture. These study centers gather together students from a wide social range. From students in secular yeshivas in Tel Aviv and Jerusalem, the circle of students has grown to include Nahal groups and study groups abroad (Ben David, 2016; Sheleg, 2010). The shared studies are part of dynamic identity processes taking place in Israel (Sheleg, 2010) and are challenging the traditional division into sectors (Shenhav, 2001) and particularly the dichotomous “religious/secular” distinction (Ben David, 2016; Sheleg, 2010).

One of the developments indicating the change occurring in the population of leisure-based students is that in addition to men, women too are studying Torah in recent years, and this change has been researched repeatedly (Bar-El, 2009; Brown (Hoizman), 1996; Elor, 1998; Halivni, 1997; Ross, 2007). Leibowitz referred to this when he said: "Distancing the study of Torah from women is the denial of a basic right, her ‘Jewishness’ becomes inferior to that of men… this situation is unbearable…” (Leibowitz, 1982). Women’s entrance into the world of Torah study reflects a lengthy process of development and socialization, where women are entering areas previously characterized by a distinctly male majority, from which they had been barred (Blum-Kulka et al., 2008; Teomim-Ben Menachem, 2013).

Torah Study Contents

Torah study deals mainly with universal contents of the relation to the Other. The following are several examples of the universality of perception of the Other.

The philosopher Levinas (1981) prioritized the issue of the Other and relates to one’s responsibility towards the other person. Levinas’ philosophy is linked to his intensive interpretation of the Talmud and scriptures (Epstein, 2001) and to having been a victim of the Holocaust. In his book “Otherwise than Being” (Levinas, 1981) and “Totality and Infinity” (Levinas, 1981), Levinas tries to examine what could have allowed such an enormous ethical failure as World War II and, on the other hand, what could have prevented the evil or the indifference towards it (Levinas, 1971). The claim is that in order to enable the existence of the world, each person should take responsibility for the Other and do good unto him (Epstein, 2001).

The relation to the other is manifested, as stated above, both in the Torah and in modern psychology. In his book “How Does Analysis Cure?” (2005), psychiatrist and psychoanalyst Kohut (who founded the self-psychology orientation) relate to the other as an attempt to experience the inner life of another while simultaneously maintaining a position of objective observation (Blum-Kulka et al., 2008). Self-psychology (Kohut, 2005) speaks of a person as dependent on the view of his surroundings in order to see himself. Empathy is an important way of achieving this goal (Blum-Kulka et al., 2008).

In Buddhist thinking as well, seeing the other is presented as a basic value of relationships. It emphasizes compassion for the other and love as the act of attachment (Burstein & Lahav, 2010).

Torah Study Methods

The methods of study as a leisure activity may affect the quality of studies and their perceived effects on the student's quality of life. The methods of Torah study in a leisure-based environment are varied (Goodman, 2017; Teomim-Ben Menachem, 2013), including face-to-face lectures, studies via electronic media, and self-study. The classical talmudic method is studying in a collaborative group called *hevruta*. The *hevruta* is a study group consisting of 2-5 people who learn together (Teomim-Ben Menachem, 2013). The Talmud presents this unique study suggestion and advocates learning together (Tractate Shabbat 63a). In the last decade, there is increasing interest in the *hevruta* form of studying (Kent, 2008). Students read the text studied to their peers and share their understanding, questions, and queries with them (Teomim-Ben Menachem, 2013). The research has found that studying in a *hevruta* creates discourse, portrays controversy, and encourages thinking out loud. The many voices and the text-based controversies may enrich and inspire the students (Goodman, 2017; Teomim-Ben Menachem, 2013).

Torah students encounter the text and their peers, who might serve as a support group and a group of affiliation, a group whose needs and fields of interest are similar to their own, and thus contribute to their quality of life (Yalom & Leszcz, 2006). In their book “Theory and Practice” (Yalom & Leszcz, 2007), they list therapeutic elements that improve the well-being of a person who participates in a group. These elements might, in their opinion, be beneficial for group member, and they include: universalism, instilling hope, imparting information, altruism, corrective reconstruction of the primary family group, and developing socialization techniques (Yalom & Leszcz, 2006).

This is what text-based bibliotherapy does for the understanding of the human soul (Angel, 2014). In this process, a creative encounter may occur between the client, the therapist, and the text. In this encounter there is a potential that the text will be used as a therapeutic tool facilitating an unthreatening approach to the emotional world (Dweiry, 2006; Cohen, 2006). The text might build a bridge to the unconscious world, a type of additional “third voice” that enables expression, processing, and insights. Text-based learning in a group (Yalom & Leszcz, 2006) as a leisure activity might offer enrichment and expression to people studying Torah, as well as development and change (Goodman, 2017), and bring about an improvement in the quality of life of those who choose to study Torah in their leisure time. Also, those studying face-to-face might enhance their life knowledge, meaning, and spirituality. In this study we examine the differences between two ways of studying Torah, course lectures and *hevruta*.

Motivation to Study Torah

Motivation to study Torah as a leisure activity is another manifestation of the shift that is occurring among Torah students (Ben David, 2016; Goodman, 2017; Sheleg, 2010). The “new learners” come to study Torah due to their desire, interest, free choice, and intrinsic motivation, rather than extrinsic pressure or constraints. The Theory of Self-Determination distinguishes between different types of motivation according to the reasons or aims that drive action. The basic distinction is between intrinsic motivation that relates to the interest or enjoyment derived from the activity itself (Assor, 1999), and extrinsic motivation that relates to motives that are unrelated to the activity itself, rather stem from a need or effort to achieve a certain result, distinct from the activity per se (Assor, 1996). It may be assumed that the motivation to study Torah in one’s leisure time is related both to studying contents that arise from the encounter and to the psychosocial benefits that accompany learning with other people (Bhabha, 2002; Sheleg, 2010).

Learning in one's leisure time contents related to relations to others, responsibility, and support of others, might constitute a means of building/expanding a significant pool of resources for the learner (Grant & Kluge, 2012; Heintzman & Patriquin, 2012; Mannell & Snelgrove, 2012).

Research Purpose

There were two research aims:

1. To examine the differences in the perception of studies (time invested, their perceived contribution and importance, and satisfaction with them) between Torah students and students of another theoretical topic.
2. To examine the effects of study methods (collaborative *hevruta* and formal lectures) on the students' perception of the studies.

These aims were examined among adult Israeli men and women, secular and religious, who chose to learn as part of their leisure activities.

Research Hypotheses

This study compared the perception of studying as a leisure activity between a group of Torah students and a control group studying another theoretical subject. The group of Torah students was divided in two: a group that was studying in a collaborative *hevruta* format and a group that was studying by attending a course lecture. The hypotheses of the current study were:

1. The perceived significance of studying and the amount of effort invested in studying would be higher among the two groups of Torah students than among the control group.
2. The level of satisfaction with studies and of their perceived contribution would be higher among the two groups of Torah students than among the control group.

Research Methodology

General Background

In this research Torah study is considered in its wide meaning, as including all traditional Jewish texts. The study included 234 respondents divided into three groups: Torah students who were studying in a *hevruta* (collaborative) format, Torah students who were studying a course by participating in lectures, and a control group who were studying a theoretical topic face-to-face by participating in lectures.

Sample Selection

The study included 234 respondents divided into three groups: a group of Torah students in the *hevruta* method, consisting of 56 respondents (23.9% of the research respondents), a group of Torah students who were studying a course by participating in lectures, consisting of 50 respondents (21.4% of the research respondents), and a control group consisting of 128 respondents who were studying a theoretical topic in a course by participating in lectures, constituting 54.7% of all respondents. The distribution of the categorical personal characteristics of the respondents in the three research groups is presented in Table 1, while the means and standard deviations of the continuous personal characteristics are presented in Table 2.

Table 1
Distribution of the Categorical Personal Characteristics in the Three Research Groups

		Research groups						
		Hevruta Torah students		**Torah course students**		**Controls**		
Characteristics	Values	*N*	%	*N*	%	*N*	%	χ^2
Gender	Men	36	64.3	34	68.0	29	22.7	****44.86*
	Women	20	35.7	16	32.0	99	72.3	
Marital status	Married	13	23.2	3	6.0	47	36.7	***17.76
	Single	43	67.8	47	94.0	81	63.3	
Religiosity	Secular	12	21.4	7	14.0	97	75.8	***90.22
	Traditional	11	19.6	11	22.0	20	15.6	
	Religious	33	58.9	32	64.0	11	8.6	
Socio-economic status	Low	18	32.1	6	12.0	32	25.0	6.58
	Medium	31	55.4	33	66.0	74	57.8	
	High	7	12.5	11	22.0	22	17.2	

***$p < .001$.

It is evident from Table 1 that there are highly significant differences in the composition of the groups. χ^2 *analyses found significant differences between the groups in gender, marital status, and religiosity. With regard to gender, it is evident that the percentage of men in the two Torah student groups is larger than that of the women, while in the control group only about one quarter are men.*

With regard to marital status, it seems that most of the respondents were single. Moreover, the percentage of the single respondents in the group of face-to-face Torah students is one third higher than in the two other groups.

A significant difference was found between the groups in religiosity as well, where in the two Torah student groups the percentage of religious respondents was much higher than that of the religious in the control group. Hence, it appears that there is a congruence between the group variable and religiosity, such that religiosity will not constitute a distinct variable in the statistical analysis. With regard to socio-economic status, no significant difference was found. Most of the respondents in the three research groups define their status as average.

Three continuous personal characteristics were explored: age, years of schooling, and study hours per week. In order to check for differences between the three research groups in these measures, one-way analyses of variance were conducted. The means and standard deviations, as well as the results of these analyses, are presented in Table 2.

Table 2
Means and Standard Deviations for the Measures of Age, Years of Schooling, and Study Hours per Week, in the Research Groups

	Research groups						
	Hevruta Torah students		Torah course students		Controls		
Measures	*M*	*SD*	*M*	*SD*	*M*	*SD*	F(2, 248)
Age	55.91	16.43	56.48	12.21	59.73	12.71	2.01
Years of schooling	16.43	4.40	17.42	3.79	17.51	4.16	1.38
Study hours per week	10.98	11.98	8.98	7.62	6.68	7.90	*4.49

$*p < .05$.

It is evident from Table 2 that the mean age of all the participants is fairly high, above 50, with no significant differences between the groups. The mean for years of schooling in all the groups is fairly high, more than 16 years, with no significant differences between the groups. Analyses of variance found a significant difference only with regard to study hours per week. The number of study hours of *Hevruta* Torah students is higher than among the formal lectures Torah students and the controls. A Scheffé analysis found a significant difference between the Hevruta Torah students and the control group.

Instruments

The research participants completed a questionnaire that included:

- *Demographic questionnaire* – The questionnaire was compiled for the current research. It included several measures that relate to various personal characteristics of the respondents. The categorical personal characteristics include gender, marital status, religiosity, and socioeconomic status. Age was measured as a continuous variable.
- *Questionnaire on the type and manner of studies* –The questionnaire included questions on the topic studied in one's leisure time, the location of the studies, the weekly and yearly number of hours devoted to studying the subject, encounters with the other students beyond the formal setting, the manner of studies (via *hevruta* or face-to-face), and whether the participant's family members study with him. Four additional questions requested that the participant rank his or her evaluation of the studies on 5-point Likert scales (1=not at all; 5=very much): satisfaction with studies, contribution of studies, extent of efforts (study hours per week), and the importance of learning the subject studied.

Procedures

The study was conducted after receiving the approval of the institutional ethics committee at Ariel University. This was followed by the distribution of 350 questionnaires, from June 2019 to October 2020. The respondents studying theoretical courses were recruited from the Brookdale Institute at Bar-Ilan University. In this institute people come to study various theoretical disciplines during their leisure time, as well as from groups of friends who study in various private settings. Those studying in the *hevruta* method were recruited from Kolot, a pluralist organization that operates Torah study groups in Israel.

The questionnaires were collected by the researcher prior to COVID-19 and in its duration. During the period of COVID-19, when no classes were held in these settings, e-mails were sent to students in Brookdale and Kolot, with a request to complete the questionnaires. In addition, people studying in the *hevruta* method in other settings and in groups established privately, were also contacted. Some received questionnaires in person and others preferred to complete them via e-mail or digitally. The questionnaires completed manually were collected by the researcher, while those completed digitally were concentrated in a single file. No respondents were rejected by the researcher. All participants signed an informed consent form.

Of the 350 questionnaires distributed, 43 were not completed in full and thus were not included in the study, and 73 questionnaires were not completed at all. The response rate was 67%. The final sample included 234 respondents.

Data Analysis

In order to check for differences between the three research groups (*Hevruta* Torah students, face-to-face Torah course students, and controls) in the categorical personal characteristics (groups of learners, gender), χ^2 *analyses were conducted. In order to check the differences in continuous personal characteristics (*age, years of schooling, weekly study hours, financial status), one-way analyses of variance were conducted.

To check the research hypotheses related to the differences between the three study groups in the continuous measures, 2×3 (Group×Gender) MANOVA analyses were conducted. Notably, when checking the distribution of the continuous research measures, normal distribution was found in all measures.

Research Results

To explore the correlations between the continuous research variables regarding perception of studies (namely, evaluation of study efforts, importance of studies, the contribution of studies and satisfaction with studies), Pearson correlations were calculated for the entire sample and separately for each of the three research groups. Table 3 presents the correlations in the entire sample between these variables, which are all significant.

Table 3
Correlations between Study Efforts, Importance of Studies, Contribution of Studies, and Satisfaction with Studies

	Study efforts	Importance of studies	Contribution of studies
Study efforts	.....		
Importance of studies	***44.	....	
Contribution of studies	***40.	***44.	......
Satisfaction	**19.	**18.	***22.

**$p < .01$. ***$p < .001$

The results indicate significant correlations among all four variables.

Differences between the three research groups – In order to investigate the two research hypotheses focusing on the differences between Hevruta Torah students, Torah course with lectures students, and the group of respondents not studying Torah (henceforth: “the control group”), comparing between male and female students, 2×3 (Group×Gender) MANOVA analyses were conducted. The dependent variables in these analyses were study efforts, importance studies, perceived contribution of studies and satisfaction with studies.

Study efforts and importance of studies – The research respondents were asked to evaluate their study efforts and the importance of studies. According to the first research hypothesis, the efforts and importance would be higher among the two Torah study groups than in the control group.

The two-way MANOVA analysis found a significant difference between the three research groups, $F(4, 454) = 3.80$, $p < .01$, $\beta = .03$. However, no significant difference was found between the male and female students, $F(2, 227) = .03$, $p > .05$, and no Group×Gender interaction was found, $F(4, 454) = 1.27$, $p > .05$. Table 4 presents the means of the three research groups and the findings of the analyses of variance conducted for each measure separately.

Table 4

Means and Standard Deviations for Study Efforts and the Importance of Studies in the Two Torah Student Groups and in the Control Group

	Research groups							
	Hevruta Torah students		Torah course students		Controls			
Measures	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F(2, 229)*	*β=*
Study efforts	3.82	96.	3.84	84.	3.59	98.	2.00	02.
Importance of studies	4.66	48.	4.69	51.	4.34	74.	***7.65	06.

***$p < .001$

It is evident from Table 4 that the analyses of variance for each measure separately found a significant difference only for the measure of the perceived importance of studies. Paired comparison Scheffé analyses found a significant difference in this measure between the two groups of Torah students and the control group. Among the Torah students, the perceived importance of studies was higher than among the students in the control group. These results support the research hypothesis that relates to the differences between Torah students and non-Torah students with regard to the importance of studies.

Satisfaction with studies and contribution of studies – The research respondents were asked to evaluate to what degree they are satisfied with the studies and to what degree they appreciate the contribution of the studies. According to the second research hypothesis, satisfaction with studies and the perceived contribution of studies would be higher among the two Torah study groups than among the control group.

The two-way 2×3 (Group×Gender) MANOVA analysis found a significant difference between the three groups, $F(6, 452) = 3.04$, $p < .01$, $\beta = .04$. However, no significant difference was found between the male and female students, $F(3, 226) = 1.26$, $p > .05$, and no significant Group×Gender interaction was found, $F(6, 452) = .77$, $p > .05$. Table 5 presents the findings regarding the differences between the three research groups for each measure separately.

Table 5
Means and Standard Deviations for Satisfaction and for the Perceived Contribution of Studies

	Research groups							
	Hevruta Torah students		Torah course students		Controls			
Measures	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F(2,229)*	*β*
Satisfaction	4.10	45.	4.20	49.	3.97	60.	*3.49	03.
Contribution of studies	4.29	35.	4.31	42.	4.04	59.	***7.79	06.

*p < .05. ***p < .001.

It is evident from the table 5 that significant differences were found between the research groups in the three measures, where the differences in the contribution of studies were greater than the differences in satisfaction. Scheffe analyses for checking the differences between the three research groups found significant differences between the two groups of Torah students and the control group on both measures. It is evident from Table 5 that the means for satisfaction and for the contribution of studies were higher in the two groups of Torah students than among the control group. These findings support the second research hypothesis whereby the contribution of studies and satisfaction would be higher among the two groups of Torah students than among the control group.

Discussion

This innovative research aims to fill a gap in the literature by exploring several aspects of adult learners' perception of Torah studies, rarely addressed in the academic literature. A literature review found no reference to engagement in Torah studies driven by free choice and intrinsic motivation. The participants in this research were adult Israeli men and women, secular and religious, who chose to study Torah as part of their leisure activities.

The main focus of the research was to explore Torah learners' perception of the efforts they invest in the study, the importance of studies, the contribution of studies and satisfaction with studies. This exploration also involved researching possible effects of study method, i.e., the amount of effort invested collaborative *hevruta* vs. course lectures, on the learners' perception of the studies.

Before discussing the results of hypothesis testing it is interesting to note that there were similarities as well as great differences in the demographic composition of the Torah and control groups. While average age (above 55) and educational level were similar, highly significant differences were found in terms of gender, religiosity' and marital status. The Torah learners were mainly religious single males while the controls were mainly secular females with twice as many married participants than among the Torah learners. Still, about one third of Torah learners were women.

The demographic characteristics of the Torah learners found here reflect the growing trend in the last two decades when gradually more people, men and women, secular and religious, Mizrahi and Ashkenazi, are choosing to study Torah in their leisure time. Apparently, Torah study has undergone a fundamental transformation from being perceived as an obligatory religious activity to an activity with personal-social-communal-cultural meaning. The learners in the present research chose to study Torah in their leisure time from among a wealth of available leisure activities, and such a choice is based on intrinsic motivation rather than the precept of "Recite it day and night".

The first hypothesis focused on the differences between the study groups in the measures of perceived study efforts and perceived importance. The perceived efforts and importance were expected to be higher among the two Torah study groups than among the control students. The first part of the hypothesis was rejected. No significant differences in perceived efforts were found between the groups. Learners in all groups were similarly engaged in their chosen leisure studies. The amount of perceived effort in both groups was rather high (a mean score close to 4 on a 1-5 point scale). Future studies should refine the definition and expand the measurement of "effort" that included only one item in the present research. For example, it is interesting to differentiate between physical efforts needed for commuting and accessing the place of learning, and mental efforts needed for effective learning. A wider and more complex view of "effort" may reveal differences between learners of different study subjects.

A surprising finding was revealed while exploring the effect of Torah study method on perceived investment. Whereas no significant differences were found among the groups in terms of perceived effort, a separate statistical analysis on the count of hours devoted to the study revealed that the number of study hours of *Hevruta* Torah students was much higher than among learners in the two other groups. This finding is surprising since it conflicts with the finding of the similarity in *the subjectively perceived* efforts found among all three groups. This conundrum indicates that the greater investment in total hours among *hevruta* learners does not translate to differences between the groups in terms of perceived efforts invested in studying. It therefore appears that the perception of effort is dependent on more than one factor, the actual method of study. As suggested above, the definition of effort should be refined to include aspects such as mental and emotional investment.

In support of the second part of the hypothesis, the perceived importance of studies was significantly higher among the students in the two Torah study groups than among the respondents in the control group. This finding coincides with the fact that the majority of Torah students were religious which suggests that most of them were probably born and raised in religious environments and were already familiar with Torah studies through the educational system in their youth and regular synagogue attendance throughout life. Therefore, their chosen leisure activity is a continuation and even maintenance of a traditional way of life.

The results support the second hypothesis whereby satisfaction and contribution of the studies would be higher among Torah students than among the control group. Indeed, significant differences were found between the two Torah groups and the control group. Among the Torah learners, satisfaction with studies and perceived contribution of studies were higher than among the controls. Additionally, a significant association was found between the perception of the contribution of studies and satisfaction with studies. Thus, the more the learners feel that the studies are beneficial, the more satisfied they are with the studies. This finding corroborates the research results of Cohen (2006), who contends that there is an association between studying and satisfaction).

This research has several limitations. First it was carried out in the center of the country and several populations that live in the periphery were not represented among the participants. Second the research measures may have been too brief and should be expanded in future studies so that each variable be assessed by more items than in the present research. The measure of effort may have been too vague and/or too general and should be refined and expanded to include both physical and mental aspects.

Conclusions and Implications

This pioneer study examined the differences in the perception of studies (time invested, their perceived contribution and importance, and satisfaction with studies) between Torah students and students of another theoretical topic. Additionally, it sought to compare the effect of the study method (collaborative *hevruta* vs attending course lectures) on these perceptions.

The results indicated that among the Torah students, regardless of the method of study, the perceived importance of studies was higher than among the controls. These results partly support the first research hypothesis because no differences between the groups were revealed for perceived efforts invested in learning,

Consistent with the second hypothesis, the perceived contribution of studies and satisfaction from studies were higher in the two groups of Torah students, regardless of the study method, than among the control group.

Therefore, it appears that Torah students' perceptions of their study as a leisure activity contributed more, was more important and more satisfying than the perception of students learning non-Torah subjects. It also appears that the study method (*hevruta* vs participation in course lectures) was not associated with any of the above perceptions. These research results provide evidence that there is a reason why more and more people opt for Torah studies nowadays.

The only difference found between the group was the actual number of hours devoted to studying that was higher among the collaborative *hevruta* group than among the two other groups (Tora-lectures and non-Torah lectures), yet' this difference was not translated to an increased perception of greater investment among the *hevruta* students.

Notably, no gender differences were found between the groups and no significant interactions were found in the statistical analyses.

The research has several theoretical and applied implications. First, it conceptualizes Torah studies as a voluntary leisure activity for diverse populations. As stated, in the last two decades gradually more people, men and women, secular and religious, Mizrahi and Ashkenazi, are choosing to study Torah in their leisure time. This growing trend transcends the Yeshiva-Torah-oriented time and place and involves free choice and enjoyment to the students, irrespective of being secular or religious. Such a transformation of Torah studies motivates and justifies the investigation of the contribution of these studies to students' perceived satisfaction. Some of the benefits of Torah studies as a leisure activity in terms of the significance, importance and satisfaction were uncovered in this study.

This pioneer study can motivate further research that continues examining the perception of Torah study a leisure activity by the Jewish population as an activity with communal and personal meaning.

The research results also have applied implications. Assuming that the perceived satisfaction with Torah studies can be generalized to more general satisfaction, we may be able to consider using these studies as a potential resource for improving the students’ psychological well-being. A possible suggestion is to establish study groups that explore ancient and traditional texts to learn about universal morals, values, the human soul, intimate relationships, family, and building a better society.

Moreover, due to the ever-growing trend of Torah studies as a leisure activity, they also have the potential to unite the various sectors of Israeli society.

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PRE-SERVICE TEACHERS' EXPERIENCES OF THE TRANSITION FROM ANALOGUE TO DIGITAL LEARNING DURING THE COVID-19 PANDEMIC

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Abstract

The transition from analogue campus-based learning to digital distance learning during the Covid-19 pandemic affected our society in many ways. This study set out to explore the experiences of 30 pre-service teachers when transitioning to digital distance learning. The pre-service teachers (PSTs) participated in a series of focus-group interviews that were subsequently analysed using qualitative content analysis. The results indicate that the transition to digital distance learning worked well and that the technology that was used performed satisfactorily. However, the PSTs experienced both opportunities and obstacles with respect to distance learning. The opportunities associated with digital distance learning were reported to be instantiated by teacher-led 'flipped classroom' teaching sessions and the additional freedom that was enjoyed by the PSTs (in both space and time). An obstacle associated with digital learning was the feeling that important aspects of interpersonal interaction disappeared. The PSTs remained sedentary and isolated at home, and the learning experience became somewhat dysfunctional when the teaching was not clearly structured and teacher-lead. The study concludes that it is not possible to replace IRL ('in real life') teaching entirely with digital distance learning. However, the results suggest that a hybrid form of teaching or elements of digital teaching can work well as a complement to future campus-based courses.

Keywords: *Covid-19, digital learning, digital teaching, distance learning, hybrid learning*

Introduction

In March of 2020, teaching at most Swedish higher education institutions were forced to implement distance education. Several questions were raised concerning this form of education, given the speed of the transition and the limited time that teachers and students had to prepare for the change.

The aim of this study was to describe the pre-service teachers' (PSTs) experiences and perceptions of the transition from analogue to digital learning during the Covid-19 pandemic. The research questions were*:* (i) What were the PSTs' experiences of the transition from analogue to digital learning? (ii) What opportunities and obstacles do they associate with digital learning? For this purpose, focus group interviews via Zoom were conducted. The conversations were recorded, transcribed, and then subjected to a qualitative content analysis.

Digitisation and the Transition to Distance Learning

Today, hardly any business or professional activity has avoided the effects of the digitalisation of society. Digital technology has been implemented and compelled change and

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development (Castells, 2011; Karanasios & Allen, 2014). At colleges and universities, this change has entailed modifying the conditions for both teachers and PSTs by imposing new strategies and modes of interaction for teaching and learning.

The Covid-19 pandemic has entailed a rapid transition to digital teaching and thus also the teachers' planning regime, which is an essential part of distance learning. Certain digital aspects of teaching hail back from the 1960s (Greenberg & Zanetis, 2012), but development in this area underwent rapid development in the 2000s (Dafgård, 2020). The pandemic has changed practices significantly since campus-based learning was closed down and replaced with distance learning.

Digital tools that were initially only available to a few people (usually experts) have now developed to a stage where almost everyone enjoys access to them and can use them. In this context, it is noted that From et al. (2020) have argued that digitalisation should focus on pedagogical practices instead of the technology *per se*. Fleischer and Kvarnsell (2015) claimed that this technology will enable new changes in teaching, for example, increased flexibility which can simultaneously involve increased risk-taking and uncertainty. The technology has thus become a compelling force for change in educational contexts as a consequence of the digitalisation of society:

> The school system must be on the leading edge with respect to what is taking place in society today and also be aware of how society is going to develop in the future. Therefore, our point of departure is one where the school system must be considered to be something dynamic and changeable instead of a conservative institution (Fleischer & Kvarnsell, 2015, p. 11).

Distance Learning and Remote Teaching

The terms *distance teaching* and *remote teaching* may, at first glance, seem to be very similar to each other, but they have several differences. *Distance teaching* refers to a "teaching that is conducted with information and communication technology where students and teachers can be separated from each other in both space and time" (SOU 2017: 44, p. 36). In contrast, *remote teaching* entails that one either provides synchronous teaching (via some or other digital tool) or asynchronously, where the student accesses the material by means of a digital tool, irrespective of the time when the materials were first produced. *Remote teaching* takes place in real-time, where students and teachers are separate in terms of space but not in time (SFS 2010: 800, 1 Chapter 3 §), which entails that the students can be gathered in a lecture room whilst the teacher is at a different location (SOU 2017:44). Based on these different definitions of these terms, it can be argued that in the domain of children's education, the phrase *remote teaching* is sometimes used since *distance learning* is not used to any great extent (Skolforskningsinstitutet, 2019). However, both terms are applicable to the tertiary education context. In this article the term *distance learning* is used as an overarching term that includes what is understood as *remote teaching*.

Distance learning can be described in terms of three phases of development (Bates, 2005), where the first phase includes distance learning via the use of simple means, for example, printed materials that are used in a correspondence course. This first phase provides minimal opportunities for communication between the teacher and student. The second phase is based on the use of multi-media materials but is also limited in terms of the communication that can take place between the student and teacher. This phase primarily consists of un-directional communication and a transfer of information from the teacher to the student. Bates (2005) argued that the third phase in the development of distance learning was realised in connection with the development of technology in the domain of video conferencing and the use of the internet. These developments have made distance learning more accessible too. The third phase offers opportunities for interaction between the teacher and the students and even between students. Besides this significant difference, students enjoy more control and a better overview of their studies and are offered opportunities to engage in dialogue and collaborative learning exercises.

Distance learning has been used since the 1990s in Sweden, primarily in sparsely populated areas, to provide students access to qualified teachers and to mitigate the effect of school closure. As technology has improved, distance learning has become more successful (Häll et al., 2007). The most significant advantages with distance learning, according to Häll et al. (2007), are access to teaching and increased flexibility (see also Hilli (2016)).

Distance Learning in Higher Education

Distance learning entails several technological challenges (Aldrin, 2017; From, 2019; Häll et al., 2007). Factors such as the quality of digital hardware, the software, and their technical integration with internet connections, cameras, microphones, and the users' computer skills all influence the efficacy of distance learning. Even though many people are used to using a computer, being required to perform new tasks on a computer may give rise to feelings of uncertainty in some users (Dafgård, 2002). Previous research has shown that with respect to PSTs, their computer literacy is often made use of in the context of work-based training *but not in campus-based activities* (Sjöberg & Hansson, 2016).

Tømte et al. (2015) demonstrated that, for those who teach PSTs, the digital tools that are available in teacher-training courses are relatively poor from a pedagogical perspective. The role of the teacher trainer, as 'a good example of a teacher' (Ungar & Baruch, 2016), is not demonstrated to its fullest. Hållsten (2017) claimed that digital solutions are primarily used for administrative purposes, for the compilation of courses and the planning of teaching (Amhag et al., 2018). However, they should be used more extensively as pedagogic tools (Lakkala & Ilomäki, 2015; Winters & Mor, 2009) to support classroom teaching and learning (Forbes & Khoo, 2015). Amhag et al. (2018) argued that teacher trainers need to identify the pedagogic value digital tools offer. Pettersson (2015) observed that the transition from (A) physical encounters between student and teacher to (B) the implementation of distance learning demands extensive changes in the structures and methods used by teachers, including how educational courses are organised and delivered. Brink et al. (2020) shared similar findings in their study of how students experienced a new culture of learning during the pandemic that included increased levels of technical support and the perception that the education that they were provided with was felt to be 'modern'. However, in this context, it was also reported that there was a lack of vision associated with the implementation and increased use of digital services.

Digital Competence

The teacher's competence is crucial when digital technology is used for pedagogical purposes (Pettersson, 2018). The competence that each teacher possesses will determine how digital tools will be used (Blau & Shamir-Inbal, 2017). Both From (2017) and Hatlevik (2016) claimed that digital competence is the fundamental factor that determines the extent to which digital tools will be used for pedagogical purposes. A high level of digital competence also contributes to more frequent use of such tools and a clearer critical perspective regarding their use. The teacher's digital competence also has a profound effect on how their students use digital tools during their education (Pettersson, 2018). The conclusion that Pettersson (2018) (see also Sipilä, (2014)) drew, suggests that a teacher's digital competence is more important than the question of whether a range of different tools are available for use (or not).

The transition from analogue to digital forms of teaching has given rise to several challenges that are related to the teacher's digital competence (Blau & Shamir-Inbal, 2017; Dafgård, 2020; Erstad & Quale, 2009; From, 2017; Lakkala & Ilomäki, 2015; Lundahl et al., 2017; Sandkuhl & Lehmann, 2017; Ungar & Baruch, 2016; Winters & Mor, 2009). However, challenges can also be related to their pedagogic competence since the analogue classroom is often merely 'translated' to the digital context, where only the location has changed. Note that in a digital context, one does not encounter the learning activities that take place in the same way as one might do in a physical classroom. Consequently, important aspects of the transformation of the teaching practice may be left out (Pettersson & Olofsson, 2013).

Something that is not always easily influenced is the choice of the specific digital tools that will be used in the teaching situation. The learning management system should, for example, contain a multifunctional user interface where both the teacher and the students can interact with each other and communicate and present their work (Lundahl et al., 2017). Furthermore, the teachers should be provided with professional development training and additional time for lesson planning with the use of digital tools. For good measure, the teacher should inform the students about what expectations will be made of them during distance learning (Saqr et al., 2020).

Several previous studies have shown that it is essential that teacher trainers and PSTs develop and integrate digital competence in the teacher education program (Hatlevik, 2016; Krumsvik, 2011, 2012; Lund et al., 2014; Tømte et al., 2015). For example, Røkenes and Krumsvik (2016) also concluded that a systematic effort needs to be made to promote digital competence and integrate the use of technology in teacher education programs. Thus far, however, it has been challenging to implement this type of professional development for teachers (Erstad & Quale, 2009).

Previous Studies on the Transition to Digital Teaching During the Covid-19 Pandemic

The Covid-19 pandemic has forced the temporary closure of campus-based learning at educational institutions worldwide (Hansson, 2021; König et al., 2020; Rapanta et al., 2020; Tang et al., 2020). This disruption has entailed not only the implementation of fundamental changes in society (Bjursell, 2020) but also changes in the philosophy of education (Jandrić et al., 2020; Quezada et al., 2020). Students have expressed their displeasure with online education in general (Tang et al., 2020), but, more specifically, they have also been disappointed by a lack of communication and not being able to receive answers to their questions. However, the practices of using 'flipped classrooms' and course evaluations were mentioned as positive digital experiences (Tang et al., 2020). Bao (2020) identified several key factors relevant to student learning during the transition to distance learning. These are: *clear instructions*, *effective communication*, *high-quality course content*, and having *a plan in place to deal with situations that may arise in the learning management system*. Other factors that contribute to the successful transition to distance learning are *access to digital tools* and *the teachers possess high levels of digital competence* (König et al., 2020; Stenliden et al., 2021). Busic et al. (2020) also noted that the students who participated in their study were not particularly skilled in using computers, a factor that negatively impacted the teachers and the learning that took place during this time. Quezada et al. (2020) demonstrated that essential strategies used in the transition to digital teaching are (i) knowledge of how one should teach in front of a camera, (ii) the possibility of receiving technical support, (iii) new forms of course evaluation, and (iv) finding new pathways to receive feedback on courses. Finding new protocols for examinations is challenging, according to Alarcón López et al. (2021), who observed that teachers are inclined to employ conventional methods of examination in a digital environment. However, Rapanta et al. (2020) stated that examinations that focus on assessment must be adapted to the new learning environment. On the other hand, Busic et al. (2020) noted that distance learning has entailed more instances where students and teachers *work alone*. The consequences of this are (i) increased isolation, where people distance themselves from society, and (for some) (ii) limited access to educational opportunities. Glancing back at this study's research questions: *(i) What were the PSTs' experiences of the transition from analogue to digital learning? (ii) What opportunities and obstacles do they associate with digital learning?* the aim of this study is to describe the pre-service teachers' (PSTs) experiences and perceptions of the transition from analogue to digital learning during the Covid-19 pandemic.

Research Methodology

Design

The present study has been designed as a qualitative interview study (Kvale & Brinkman, 2009) with PSTs who are enrolled at a university in southern Sweden. A semi-structured approach was used during the focus-group interviews (Halkier, 2010; Wibeck, 2010), a type of interview best suited to examine people's individual and collective experiences in groups of participants who find themselves in a shared context or situation (Wibeck, 2010). A semi-structured interview guide (fixed questions, not in a fixed order or in fixed numbers, with the option to ask additional questions) was used in the focus-group interviews (Lantz, 2013) that included questions regarding the PSTs' experiences of the opportunities and obstacles that they experienced during the transition from analogue to digital teaching.

Data Collection

The PSTs were asked to participate in the focus group interviews via messages from within the Canvas learning management system in May 2020 (internal e-mailing system). PSTs who were enrolled in at least one of the following courses were asked to participate in the study: *Kulturmöten och Interkulturell pedagogik, Examensarbete, Utbildningsvetenskaplig kärna II*, or *Utbildningsvetenskaplig kärna IV*. In total 30 PSTs accepted to participate in the study (16 male and 14 female PSTs). All the participants were PSTs enrolled in the VAL teacher education program; a short teacher training program offered to active teachers who lack teaching qualifications. When scheduling the focus group interviews it added up to a total of eight focus group sessions where the groups differed in size from three to six PSTs in each group during June 2020. Zoom video conferencing was used for this purpose. Each interview lasted between 25 and 53 minutes and were subsequently transcribed.

Data Analysis

A qualitative content analysis was applied in the analysis of the data (Krippendorff, 2004) on a latent abstraction level, where the researchers interpreted the content of the interviews (Graneheim & Lundman, 2004). The purpose of the analysis was to provide a rich and thick description of what appeared in the participants' narratives (Elo & Kyngäs, 2008). The analysis was performed in three stages (Creswell 2014; Larsen, 2009; Tesch, 1990). First, the interviews were transcribed. Then all the interview transcripts were read closely, and coded keywords were added. In the final stage, all interviews were read through again and content categories based on the keywords were created. In the results section the quotes from the focus groups are referred to an individual from the focus group. The individual's comment should be seen as a product of the discussions from within the focus group. It is still debated within the social and behavioural sciences as to how data from focus groups should be analysed (Onwuegbuzie et al., 2009 and that focus group data can arise from individual data, group data, and/or group interaction data (Duggleby, 2005). Six themes were identified in the material with respect to how the PSTs experienced different aspects of the teaching that was provided to them during the transition from analogue to digital learning. The six themes were: (i) *Digital teaching saves time, allows for more freedom, and is more effective*; (ii) *Teacher-led flipped classrooms in small groups work well in a digital context*; (iii) *Digital professional development also takes place*; (iv) *The social interaction with classmates and the teacher is lacking*; (v) *Digital distance learning does not work if it does not include teacher-led teaching*; (vi) *Important aspects of interpersonal interaction is absent*.

Ethical Considerations

The participants were informed of the study's aims and gave their consent to participate in the study. The participants' right to integrity resulted in their information and identity being treated in confidence. They are referred to in the text by means of anonymised codes, for example, F1M1, where 'F1' indicates the focus group the participant was a member of and the 'M1' indicates the gender and the unique number of the participant. In summary, our study adhered to the ethical requirements that research in the humanities and social sciences are subject to (Vetenskapsrådet, 2017).

Research Results

The PSTs reported that they began the autumn term with campus-based learning. When the Covid-19 restrictions were initially put in place at the end of March 2020, all campus-based learning was replaced by distance learning. Almost all the PSTs interviewed stated that the transition to digital learning worked quite well. One student remarked: "The transition has been smooth and comfortable, if I were to summarise it." (F5M3). Several PSTs reported that, in the beginning, they were worried about the prospect of learning via distance learning only but that this mode had worked better than they had expected. In the distance learning that was provided, the teachers primarily used Canvas, Zoom, e-mail, and Kaltura. The respondents reported that these technologies and the digital tools that they used during their courses worked well. Many PSTs claimed that the reason why they worked so well was that their courses had first started as campus-based learning, and so they had had the opportunity to meet with their teachers and classmates before the changeover to digital learning:

> I get more out of the lectures if I have personally met the lecturer before the course starts. It does not play such a big role when I have met the teacher before if it [the course] is via the internet. However, those teachers whom I did not meet beforehand, it has been a little bit more difficult […] I believe that with distance learning, it is great that you get to meet them first…because it also involves interrupting and asking questions during a lecture where you have personally met the lecturer…it feels more personal than doing that with someone whom you have not met. (F4F2).

Even though the transition was experienced as something positive, and the technology worked well for the PSTs, several other student perceptions regarding opportunities and obstacles related to digital distance learning were reported during the interviews. Most of the PSTs felt that there were advantages and new possibilities to be enjoyed with distance learning. The advantages involved some of the practical aspects associated with their learning and the content of the different courses. At the same time, most of the PSTs experienced several disadvantages with distance learning. Some PSTs claimed that a crucial part of being a student is partaking in student social life and meeting with one's classmates, an opportunity that disappeared with the transition over to distance learning. Some PSTs reported that they experienced decreased learning performance when the interpersonal interaction was lost. In fact, several PSTs stated that they lived a sedentary life at home where they sat in front of the computer screen for whole days at a time over a period of weeks during the pandemic, and this behaviour had negatively impacted their health and well-being. Below, the six themes are presented; the PSTs' experiences of the opportunities and obstacles associated with the transition to distance learning.

Digital Teaching Saves Time, Allows for More Freedom, and is More Effective

A common perception shared by the PSTs regarding distance learning is that it saves time: "I think that what is positive with this experiment is that it saves time. We save time…we use the time wisely, you might say." (F2M2). According to the PSTs, not needing to spend time travelling to the university created a great sense of freedom: "Distance learning created more space, you know, … you don't need to go to the school...you have more freedom." (F7M2). Another student in the same focus group remarked: "You know, distance learning can open up more opportunities. It saves time." (F7F2). In addition to being a time-saving process and providing the PSTs with more freedom, distance learning was also described as being a more effective learning method, according to some PSTs:

> Having a PowerPoint or a digital lecture gave me precisely the same thing as if I were in the lecture hall…I think that you can provide that with the same quality digitally…and we are more effective via a digital link. (F5M3).

Some PSTs claimed that their levels of motivation to study had increased when teaching transitioned to distance learning:

> For me, on a practical level, it has increased my motivation because you don't have to be on site…you don't need to spend some much time driving […] If you have to drive for three hours to get to Jönköping, then you are totally exhausted when you are supposed to absorb everything. But now, when you wake up…take it easy, and your mind is clearer… so this has increased my motivation. (F4M1).

PSTs who were parents of young children were particularly satisfied with the freedom and efficiency that distance learning entailed: "For us who are parents of young children, distance learning has been a really nice experience. It has been great for me […] really great to be able to work from home." (F4F2).

Teacher-Led Flipped Classrooms in Small Groups Work Well in a Digital Context

The type of teaching that the PSTs perceived as the best approach during the transition to distance learning was when they were involved in teacher-led flipped classrooms in small groups where the PSTs were tasked to read up on something, before they met in Zoom or on the Canvas platform:

> I was delighted because the set-up is excellent, you know…and the teacher's level of involvement was what motivated me…hats off to the technology…but the teacher's way of using the technology was good. Both the seminar form where you read up on something beforehand…when we read literature…you have the other's stories before you discuss

> it, you know. That is great. […] The group discussions went much smoother than what they would have had they been on campus […] The group discussions are a good way to use the pedagogics together with the technology. (F2M1).

In some of the courses that they attended, the PSTs were tasked to participate in obligatory discussions on Canvas, which could take place over the course of a week. The discussions could only proceed if every student had read the same text(s). This form of teaching was positively received by the PSTs, who reported on its educational value:

> The lengthy discussions developed into excellent assignments…it was an excellent assignment because you had enough time to reflect on every element […] now you had time to read every contribution thoroughly. So even if we now return to having physical meetings, you can still have similar assignments, which is an advantage. (F1M1).

> The discussion assignments made you become more engaged and conversant [in the topic] […] primarily I thought that it was nice to have it on Monday since you had read through everyone’s texts and reflected over them…and then you go through a whole workweek and think about them in the back of your mind all the time…I thought that this was rewarding. (F1M2).

A recurring topic in the focus-group conversations included the PSTs’ perceptions of how important it was that the interactive group learning that took place was structured and teacher-led: “Both orally and the writing have worked well with the discussions, but the assignment must still be arranged so that there are no doubts about what should be done.” (F2F2). Another form of interactive teacher-led group instruction that the PSTs reported on as being successful in a digital context was the group supervision and the assessment of their thesis work. Many PSTs also reported that they appreciated that they could access recorded lectures via the Canvas platform. This reduced the amount of stress they felt since they were not bound to attend lectures at a particular time of day: “You feel calmer when you know that you can watch a lecture when you have time and you when you have more time…I have not felt as stressed” (F1F2). According to several PSTs, another advantage that was associated with the recorded lectures was the possibility to stop and re-start the lectures and even listen to them several times over: “I also see some advantages with the recorded lectures…for example, you can rewind if there are things that you need repeating or listen to again.” (F8M1). One student remarked that the recorded lectures facilitated his learning:

> I want to mention one thing that I liked a lot. When the teacher recorded their lectures, I could listen to them several times over to improve my understanding…If I didn’t understand something, then I could listen to it again…that was good…I liked that. I have also listened to them on my mobile phone, and this has given me time to understand the depth of the subject. It is good that this is saved so you can repeat and listen when there is peace and quiet for us who are slightly linguistically challenged. (F2M4).

Digital Professional Development Also Takes Place

One observation that emerged during the focus-group interviews was that, during the transition, PSTs who were not used to using digital tools in an educational context were forced to do so: “I think that it is also exciting to try out something new…it is interesting to see that things can be done differently and still achieve the same thing.” (F1F1). Most of the PSTs thought that this worked well, and they found it interesting to test and learn about new digital tools: "I think that it has worked out really well…we have tested Zoom, and we have tested a whole lot of other programs too." (F1M1). A different student related how he had learnt about these digital tools during his studies and had adapted to them:

> We used Google Docs, of course, where we wrote in documents at the same time…then we also used Google Meets or Hangouts where you can share…so you could share the document so that any one of us could write. We also used different tools. We used the telephone, of course. I conducted some interviews via Google Meets, and with the telephone…you used the technology in all possible ways. You adapted [to the situation]. (F7M2).

All the PSTs who were interviewed for this study were enrolled in a teacher training program where they were expected to be able to use digital tools in their future careers. Many of the PSTs reported that they experienced the transition to digital distance learning as a good professional development experience in using digital tools in their future career:

> This was like a professional development course in digitalisation. I was, of course, really stressed by that PowerPoint presentation…but it went really well…I have become more acquainted with these digital tools, which I think I will use when I am teaching at school. (F6K2).

The Social Interaction with Classmates and the Teacher is Lacking

Many of the PSTs maintained that they missed meeting with their course-mates, socially and to discuss IRL: "You don't meet with each other face-to-face and talk with each other in the same way…you don't get that connection which you have when you meet on-site." (F1F1). The PSTs felt that meeting each other online could not replace the physical interpersonal meetings and informal conversations between classmates that usually take place on the university's physical campus. "Of course, you miss those informal conversations when you take a rest-break." (F7F1). One student described the situation as follows:

> You know, you miss it when there is a rest-break, and you go off for a coffee…have a chat about any topic you like with your fellow course-mates. You miss that…of course, you can do it digitally, to a certain degree, but the social aspects are a bit boring. Obviously, you miss it when you just sit in front of the screen […]. It is not really the same, digitally…not really the same feeling, to put it mildly. There is also a type of interaction…but it is not real. It's not genuine. (F4M1).

Another aspect to the social interaction that is missing in the digital distance learning context was that the PSTs missed taking a break from their everyday environments at home, for example, which they would experience if they had to travel to a new environment and meet with their course-mates:

> The aim of studying on the campus or digitally is that we are to learn…but I think that visiting the campus is better for one's recovery and from disconnecting from work. To have a different life, you might say…so, for me, it is better to study at the university. (F2M2).

Digital Distance Learning Does Not Work if it Does Not Include Teacher-Led Teaching

The PSTs considered it important that a lecturer direct their distance learning. Many PSTs reported that digital interactive activities that were not teacher-led were not effective:

> You miss physically meeting with the other PSTs…it doesn't work well. It works with the teacher but not with those with whom I am writing an assignment …it is a bit more difficult. We need those moments to sit together and write…so it was really difficult for us during these times of the Corona virus. (F1M3).

Specifically, the obligatory group- and pair-work activities that were not teacher-led did not work well during the transition to digital learning:

> There is just one downside, so to speak…the disadvantage in this thing. The group-work did not work…didn't work well with the communication. So, with the group work, it makes me a bit doubtful about this digital [approach]. (F2M2).

> I always think that distance [learning] and group-work is difficult […] It is difficult when you don't physically sit together…especially when we haven't met anyone in the group before…but if you know the people so then there is no problem with a digital solution…it takes more time before you find a way of cooperating via *Teams*. (F4F1).

Important Aspects of Interpersonal Interaction are Absent

Most of the PSTs felt that part of the interpersonal interaction that they experienced on campus disappeared during the transition to distance learning: "When you meet other in person then there is a different type of energy…in reality when you meet…there is energy…there are expressions…this is emphasis…that are other things." (F5M1). Three other PSTs share this sentiment:

> For me it was a negative thing to go from analogue to digital. It was pretty difficult for me actually […] I really like the analogue experience…being face-to-face and discussing [things]…but to listen for two hours is a bit difficult […] I learn better when I am with others and talk and discuss… or when my teacher is present than when it is digital. (F8M2).

> I like meeting with people…you don't just talk with your mouth but with your whole body. I like reactions with the whole body…and it is not the same via the computer. It is not the same. I think that you lose those small nuances. (F5F1).

> You miss the meetings…the dialogues with your classmates…and to be able to have a live dialogue with your lecturer…those more spontaneous questions which perhaps arise in the situation during a lecture. (F8M1)

According to many of the PSTs, the spontaneity and authenticity in their communication are diminished in the context of distance learning:

> I believe that we lose some information from your teacher and course coordinator. You know, those subtle things…those things that emerge in the room that you might not have planned for as a teacher but emerge as a need that we want to learn more about. I might suspect that we have lost something there…I need to meet physically in the lecture room. (F6F2)

> You have lasting impressions or a better memory of what you hear during a lecture when you are actually there. Then it is more like a complete experience. I think that you learn more at a lecture if you are in physical attendance. (F8F1)

Several PSTs reported that they missed the spontaneous interaction that takes place between the teacher and the PSTs during campus-based lectures. Distance learning was not appreciated by every student and was considered to impact the teaching and learning of course content negatively:

> I am used to having the teacher standing in front of the whiteboard and writing…and then suddenly you have to enter the digital world…then the teacher just sits behind their microphone, of course. I think that you miss it when you have distance learning, and you also miss the interpersonal interaction too […] Because sometimes it is important that the teacher writes on the whiteboard, and we take notes…which determines that you understand that part of the course. That doesn't exist in the digital…then you just sit and listen and listen. (F4M1)
>
> Regarding the pre-recorded videos, I think that you lose something since you can't ask questions […] And you don't have any interaction with the pre-recorded videos. So, I think a great deal is lacking because then you often have a question to ask and would like an answer, of course. (F1M2)

The PSTs even felt that the digital communication with their classmates was not as good as it was in the context of analogue communication:

> You don't communicate in the same way. You are, of course, limited in your communication…you really are. You mostly say your own thing. It feels like there is not so much two-way communication […] more one-way communication. I say what I have to say and the opponent group says what they have to say. You don't have time to create a discussion in the same way as if you were to meet physically. (F7M2)
>
> Of course, it is not at all like a fluid discussion…it is a completely different way than if you sat in on a discussion with some people around a table. Here you get little apology…'may I interrupt' and it is difficult to follow. (F7F1)

Discussion

The PSTs who participated in this study reported that the transition to digital distance learning worked relatively well. Other studies (for example, Tang et al., 2020) have demonstrated that other groups of students have been generally dissatisfied with online teaching. One reason behind the positive attitudes that are reported on in this study, and highlighted by the PSTs themselves, was that they had started their on-campus courses before the Covid-19 pandemic broke out. They already had made acquaintance with each other and met their teachers IRL before the transition. Another reason for the positive attitudes is probably because most of the teachers possess a great deal of experience of teaching in front of a camera (Quezada et al., 2020). However, our student participants also remarked on the uncertainty that some PSTs experience in conjunction with new digital exercises and practices (Dafgård, 2002). Bao (2020) argued that critical factors for student learning in the context of distance learning are clear instructions and effective communication. The dissatisfaction regarding a lack of communication and not being able to receive answers to one's questions, as described by Tang et al. (2020), was experienced as a partial problem by our interviewees too. Furthermore, the PSTs felt that the technology which was used in the courses worked well. Thus, the technical challenges highlighted by Aldrin (2017), From (2019), and Häll et al. (2007) can be overcome.

The findings in this study thus show that there are both positive and negative aspects of distance learning from a student's perspective. According to the PSTs, a positive feature was the opportunity to participate in teacher-led flipped classrooms in small groups. In the context of the flipped classroom, they participated in group discussions, were provided supervision, and wrote examinations after they had read the same texts or watched a recorded lecture that informed the group meetings. The PSTs' positive digital experiences in connection with the flipped classroom are also remarked on by Tang et al. (2020). Another positive aspect of digital distance learning which was observed (and agrees with previous studies (Fleischer & Kvarnsell, 2015; Hilli, 2016; Häll et al., 2007)) were the PSTs' reported experiences of greater freedom and increased flexibility with regards to their use of space and time. A significant negative point of digital distance learning was the deterioration of the social aspects of regular student life, something which is important for many PSTs. This phenomenon is also remarked on by Busic et al. (2020). Many of the PSTs reported that they had difficulties in absorbing the content of lectures and seminars when essential aspects of the interpersonal interaction were missing. According to the PSTs, learning that was not teacher-led was least effective, for example, group work that did not enjoy leadership from a teacher.

In the Context of Distance Learning, Pedagogy Supersedes Technology

When teachers transition from analogue to digital teaching without a great deal of reflection and forethought, the use of technology and the teacher's pedagogic digital competence is lacking (Pettersson & Olofsson, 2013). This could be compared to Shulman's PCK concept (Shulman, 1986). Obviously, it is more difficult for the teacher to participate in distance learning, but it is not impossible. For this to happen, teachers need digital competence that they can use to deliver an effective pedagogy (From, 2017; Hatlevik, 2016). One way of deploying one's pedagogy with technology can be found in the group discussions that were arranged in the learning management platform. Not least because the PSTs were given time to reflect on the work that they had done and because the learning platform consists of a multifunctional interface. In this context, Lundahl et al. (2017) observed that presentations, interactions, and communication are made possible. Regarding the pre-recorded lectures, they were parts of the course that were both appreciated and questioned by the PSTs. The opportunity to pause the playback of a lecture and repeat sections of a lecture was something that the PSTs experienced as positive since it gave them time to reflect on what they had learnt. However, they also remarked that they missed interacting with the teacher during the lectures since they could not ask questions or make comments. Our findings demonstrate that digital learning saves time, provides more freedom to the PSTs, and is effective. At the same time, not every aspect of digital distance learning is satisfactory for PSTs. Consequently, there is a need for further research as to how this situation can be improved. If faced with a similar situation in the future, alternative opportunities must be offered for student-teacher and student-student interaction so that the PSTs can feel that they can ask questions and that they will be answered. By allowing the PSTs to encounter different technologies in the context of digital learning, the professional development of future teachers is also enabled, so their PSTs will, in turn, enjoy the opportunity to engage in hybrid learning and become proficient in this domain. This is a competence that Erstad and Quale (2009) call for.

Implications for Pedagogy

In the light of the forced changes that teaching and examinations in higher education have undergone, it is reasonable to assume that education in the future will comprise a more varied content than was previously the case. The term *hybrid learning* has already been coined, and practices such as *blended learning* and *the flipped classroom* have been described as positive experiences by Tang et al. (2020), for example. Similar observations have been made in the present study. Some of our respondents were quite clear in stating that elements of their learning experience, for example, when they discussed ideas in a discussion forum during a limited time period, should remain on the curriculum. This lies in agreement with the observation that the teachers used the technology that was available to them effectively. The study has also shown that the provision of supervision, examinations, and the literature review and thesis seminars worked well in a digital context. These are all elements that future hybrid learning can take on board. However, it should be noted that pedagogical practices must remain central to the PSTs' learning and not the technology. Several PSTs reported that teaching and learning are negatively impacted if the pedagogy is not adapted to the digital context. Furthermore, future teaching practices should include teacher-led learning that features clear and timely information and responses from the course coordinator and teachers. Rapid feedback via e-mail or the teachers' frequent attendance in discussion forums (where the teacher-moderator makes comments and responds to questions) improve the PSTs' experience of teacher-led activities. Furthermore, PSTs feel that they are taken notice of during such exercises. Obviously, receiving a rapid response to one's questions by a teacher allows the PSTs to proceed in their work and not be distracted by something that they do not understand. In summary, one can say that the *available teacher* is one who demonstrates high levels of involvement in their PSTs and the course. One focus group remarked that: "the teacher's involvement is what has made us motivated" (F2M1). However, one should not forget that many PSTs found it difficult to cooperate with each other in the context of digital distance learning, especially if they had not personally met with each other prior to the course commencement. Teachers should consider this issue so that they can offer opportunities for their PSTs to establish interpersonal relationships and thereby facilitate the pair- or group-work that they may engage in as part of their distance learning.

Conclusions and Implications

The forced transition from analogue to digital teaching seems to have worked beyond expectations for the respondents. Nevertheless, important aspects of interpersonal communication are absent in digital teaching that may be difficult to do anything about. Although, this is something that needs to be kept in mind in the future and try to change the pedagogy to bridge the interpersonal communication and interaction in as many ways as possible. Furthermore, when it comes to pedagogy, what stands out in this study about digital teaching and digital learning, is that it is the pedagogy and available teachers that are central, not the technology; how and for what purposes the technology is being used. This study confirms part of the results of previous studies with other groups of students. Although, it is of importance that future studies describe specific and situational experiences from students from different educational contexts. This must be achieved to acquire a nuanced picture of opportunities and obstacles with digital teaching.

Declaration of Interest

Authors declare no competing interest.

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THE INTERDEPENDENCE BETWEEN PERCEIVED SELF-EFFICACY AND SELF-ASSESSMENT SKILLS OF ACADEMIC PROGRESS IN STUDENTS

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Abstract

Self-assessment in the school environment can be defined as the students' ability to make valuable judgements about their own academic performance, either by reference to the teacher's educational goals, previous academic results, or the academic performance of other colleagues. The formation of such self-assessment skills is strongly influenced by a number of internal and external psycho-pedagogical factors, including chronological age, motivation for learning, level of cognitive development, perceived self-efficacy, the teacher's teaching style, the social status of the student's family, their group affiliation, etc. Starting from this point, the purpose of the present research was the analysis of the students' degree of awareness of the role of perceived self-efficacy in the formation of objective didactic self-evaluation skills. The research sample consisted of 108 students, currently attending the Psycho-Pedagogy and Methodology Study Program courses at the University of Oradea and Emanuel University of Oradea, Romania. The research methodology was targeted at requesting these students to self-assess their performance in a subject of the afore-stated study program, respectively administering a scale for measuring personal self-efficacy. The results showed that most of the students tended to either evaluate themselves objectively or under-evaluate themselves, against the backdrop of a high level of perceived self-efficacy, respectively of superior academic performance.

Keywords: *academic performance, didactic self-evaluation skills, perceived self-efficacy, self-image, teaching career*

Introduction

One of the basic principles on which the educational process is based is that of the active and conscious participation of the individuals involved in the learning process, in developing and bringing their own personality to perfection. Both the psycho-pedagogical literature as well as common sense point out the fact that, in the pedagogical practice of the last decades, the effects of this principle have thus far only started to make headway with regard to teaching/learning strategies and to a much lesser extent in relation to examination strategies (the student being practically forced to accept with resignation the results of the evaluation). Several authors (Guţu & Vicol, 2014) have opined that the controlled involvement of students in the assessment of their own school performance will confer formative valences upon it and a particular efficiency in that the teacher, based on the students' opinion acquires confirmation of his appreciations; thus students become subjects of the pedagogical action and are able to better appreciate the value of their own work, thus developing an intrinsic motivation and a positive attitude towards academic learning. Therefore, the essential benefit that the students' active involvement in the didactic evaluation could have both on the educational agents and on the entire instructive-formative process is represented by the increase of their capacity for self-regulation and self-development (Marian, 2018).

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New global trends in conceptualizing and designing the evaluation of academic results take into account the focus on academic skills, identified as the final goals of education; the transition from the normative assessment, focused on the teacher, to the formative assessment, focused on the student and on their functional competencies; changing the assessment's design conditions (gradual transition from standardized assessment to authentic or Hayes contextualized assessment of academic results). In recent years, a redefinition of school competency has been achieved, defining it as being a structured set of knowledge, skills, abilities, and attitudes acquired through learning, which facilitate the identification and the sorting out, in various contexts, of problems characteristic to a certain field (Petrovan, 2015).

One of the main components of interactive assessment is educating the students' capacity for self-appreciation and self-assessment. In order for that to happen, it is necessary to provide them with criteria (benchmarks) that they can understand and internalize through verbalization (Andrade, 2010; Sargeant, 2008). The transition from evaluation to self-evaluation is not instantaneous, the whole process being a long one and requiring the involvement of all educational actors (Marinescu, 2021).

Research Problem

Didactic self-assessment targets the student's ability to make valuable judgements about their own school competencies and performances, as well as generally, about themselves (Blândul, 2014). In other words, school self-assessment targets the relationship established between the student's cognitive, emotional, and practical skills that facilitate the achievement of certain academic performances as an expression of accomplishing a learning task. The two dimensions, however, are not always directly related. Sometimes students may possess high availability, but this does not in fact become actualized through completion of an academic task at optimal parameters. However, an inverse situation is also possible, in which students acquire special didactic performances while possessing only limited abilities for that activity. In such cases, the precise role of academic self-assessment is to reflect the real level of their own academic competencies in order to facilitate the achievement of expected performance.

The development of didactic self-assessment skills in students has awakened a real interest from many research studies, who have placed it in the "unconventional assessment" area of interest. The motivation for such an option is given by the fact that academic self-assessment transcends the traditional framework of school progress evaluation, placing the student in the double capacity of both "subject" and "object" of this approach. On the other hand, in issuing value judgments about his own academic performance, the student could detach himself from the specificity of the didactic objectives established by the teacher (which, in certain situations, he/she does not even know), of the criteria for awarding academic grades or the rigor of the evaluation strategies administered by the educator. On the contrary, in formulating assessments regarding their own academic performance, the student could take into account personal educational goals, the effort made in order to achieve learning tasks or other students' performance (Kiss, 2018). In these circumstances, the development of students' didactic self-evaluation competencies is based on the following explanatory theoretical models (Blândul, 2014):

A. *The no-objectives self-assessment model* – proposes a type of assessment in which the decision is made primarily according to the context and the educational agents involved.
B. *The model of responsive self-assessment* – the process is predominantly focused on interaction and negotiation, depending on the concrete realities in the classroom.
C. *The model of illuminative self-assessment* – the process is based on exclusively qualitative characteristics.

D. *The model of naturalistic self-assessment* – offers a holistic vision on the objectives and components of self-assessment, explaining their effects, significance, and functioning.
E. *The model of qualitative self-assessment* – involves the following sequences: observation, description, interpretation, estimation.

Neacșu (2011) considered it necessary to develop students' self-assessment capacities, as an act of reflexive self-observation of their own cognitive processes, of their own behaviors, conducts, attitudes, but also of their own deficiencies in exercising the didactic behavior; in terms of motivation-attitude, self-assessment cultivates students' inner motivation as regards the future teacher profession and makes them responsible, making them much more aware of the importance of their upcoming didactic mission.

According to these explanatory theoretical models, the didactic self-assessment competencies are formed progressively, requiring time and the involvement of all educational factors. Thus, on the external level, the self-assessment of the academic progress is determined by way of accomplishing the didactic act (teaching/learning/evaluation), by the students' social status, their group affiliation and family status. Internally, self-assessment has a bifactorial determination, being influenced by an affective-motivational and cognitive-estimative component (Andrade, 2010; Panadero & Romero, 2014; Zimmerman & Schunk, 2011). Also of great importance are the chronological age of the student, as well as the type of self-assessment used. All these factors contribute to the shaping of the person's self-image, a phenomenon closely interconnected with the development of didactical self-assessment competence.

The period of adolescence / post-adolescence – corresponding to the high-school cycle, respectively, most often, the university years – offers a series of manifestations that define it as one of the most intense periods in one's entire life. Even if in the end they can be considered physically, intellectually, or morally mature, the process of emotional maturation continues. Adolescents get hooked on temptations such as: the need to stand out at any cost, to rebel, to have illusions of invulnerability, to always seek "new thrills", to have a heightened degree of aggression, the need to expand their social network, the need to succeed, etc. Under these circumstances, the balance between the elements that make up the components of self-assessment may break, most likely in the inversely proportional direction. Thus, adolescents may face one of the following two situations: either they show a high level of ambition and over-estimate their own potential, consequently having the tendency to underestimate the difficulty of the task; or, on the contrary, the level of aspiration and estimation of their own potential is reduced, in which case there is an overestimation of the degree of difficulty of the task. Therefore, the intellectual development on which many teachers rely in the practice of self-assessment in adolescents, cannot be considered the ultimate argument to accomplishing this approach, as long as the psycho-affective instability characteristic of the age is neglected. However, the formation and development of self-assessment competence (through teaching methods and not only) can play a special regulatory role in achieving the balance between the afore-mentioned factors, with a special formative effect for bringing to perfection the personality of young people (Andrade & Brookhart, 2020; Bourke, 2014; Wang, 2017).

As already shown in a previous study (Blândul & Bradea, 2022), many of the research studies on self-assessment associate it with self-efficacy. Bandura (1977, 1997) formally defined perceived self-efficacy as personal judgements regarding one's ability to organize and perform tasks in order to achieve designated goals and sought to assess its level, generality and strength in activities and contexts. The level of self-efficacy refers to its dependence on the difficulty of a certain task; generality refers to the transferability of self-efficacy beliefs between activities; the strength of perceived efficacy is measured by the certainty regarding the accomplishment of a given task (Bandura, 1997). In terms of its content, self-efficacy measures focus on performance capabilities rather than on personal qualities, such as someone's physical or psychological characteristics. Self-efficacy beliefs have a multidimensional form and differ depending on the context (the subject matter for which they are being assessed, the place where learning takes place, the task's level of difficulty, the involvement in assessment and self-assessment processes etc.). Finally, self-efficacy judgements refer specifically to future functioning and are assessed before students carry out the relevant activities. According to Bandura (1997), this antecedent property positions self-efficacy judgements so that they play a causal role in academic motivation.

In a study exploring self-efficacy in writing, Pajares et al. (2007) found that the way in which students interpret the results of their own past writing performances can make a key contribution to their sense of self-efficacy. In another study, Graham et al. (2018) found that the sense of self-efficacy contributed 10% to predicting students' writing outcomes and the percentage is even higher (16.3%) for students with disabilities.

Studies that focus on the relationship of students' self-efficacy to past performance and its impact on future performance have explored a variety of activities and their potential to increase students' self-efficacy (Bandura, 1997; Pajares, 1997; Schunk, 1989, 1991; Shell et al., 1989; Zimmerman, 1995, 2000; Zimmerman & Kitsantas, 1997, 1999). One of the most notable of these is self-assessment which occurs when people evaluate their own work, identify differences between their current and desired performance and reflect on ways they can improve (McMillan & Hearn, 2008). Guiding students through this process of self-reflection and supporting the development of self-assessment skills offers them a sense of security and control over their own learning, which can increase their motivation and self-efficacy (Panadero et al., 2016). The self-assessment process also contributes to students' sense of self-efficacy and conditioned knowledge as they commit to reflecting on their own learning and improving their own work (Corkett et al., 2011; Schunk & Swartz, 1993). A planned review process that includes student self-assessment and reflection (McMillan & Hearn, 2008) has a positive impact on self-efficacy. The recommendations made by Hayes (2012) in this regard are meant to encourage students to take on their own learning, while allowing them to assess their strengths and areas that can be improved, providing guidance on how to perform complicated tasks, and encouraging them to reflect on their performance.

Self-assessment is a very complex process, but it is not done in isolation. Beyond the internal bio-psychological factors mentioned, there are also a number of external factors. Thus, the type of self-assessment performed by students is influenced both by the requirements of the teacher and the academic status of that student, as well as by the parental requirements and the status of the student's family. Recognizing the permanent nature of the process, many authors differentiate between formal and informal self-assessment. The formal dimension is given by the organized, systematic, and explicit character of the phenomenon It appears when students are confronted with the task that needs to be solved and manifests itself by the issue of value judgments (based on objective criteria) regarding the actual performance of the student, judgments that are then to be superimposed over those of teachers or parents, colleagues, or the social group. On the contrary, informal self-evaluation has a spontaneous, non-systematic, and implicit character, it is not determined by a specific learning task. It is not based on rigorously objective criteria, and it materializes into personal opinions or impressions; nevertheless, it has a special value in shaping the self-image and the background on which the formal self-assessment will be performed (Maier, 2014).

As already mentioned, the development of self-assessment / inter-assessment competence is not a process that can be done "by itself", by simply accumulating academic and social experiences. The decisive role belongs to the teacher who has a role model value for his students, who select the behavior manifested in a certain context and gradually internalize it through imitation. Specifically, while observing the teacher during an examination event, the students will monitor their mode of action (the end goals they have in mind, the criteria according to which they are guided in formulating assessments, the methods and the tools they use, etc.), transforming these sensory experiences (based on memory associations) into others, structured and integrated at a higher cognitive level, manifested thereafter into responses applicable to analogous situations (becoming able to adopt the behavior of an evaluator for himself or for others). In fact, the appreciation made by the teacher and internalized by the student becomes self-appreciation. Based on the assessments made by the teacher, the student can become aware of the criteria used and of the academic requirements, thus adjusting their aspirations and behavior to properly meet them. Also, the teacher's assessments are reflected in the way the student is perceived by their peers. Gradually, by internalizing these norms, students will be able to get to know themselves and position themselves as close as possible to reality within the group to which they belong. Hence the overwhelming importance of evaluating as accurately as possible the performance of students for their subsequent development (Pop, 2017). To be an as effective as possible model for developing self-assessment competency in students, it is necessary that the teacher be held in high esteem as well as provide students with easily accessible imitable behavior and very clear instructions.

Additionally, when discussing pedagogical deontology with reference to docimological behaviors, several useful recommendations can be made to all teachers. Starting from the axiom that evaluation is a means by which the teacher guides the students' development process, many authors argue that they should be evaluated for what they know, can, do and the positive aspects of their own academic behavior. The process must have a prognosticative character (anticipate and support the evolution of students), and, in the case of poor grades, they must be strictly limited to the conditions that generated them. Analogous to the axiom that assessment must reflect teaching, we are reminded of the teachers' moral obligation to ask of students only behaviors that they themselves possess, to recognize and attribute to them the merits for their successes and to take responsibility for possible collective failures. Finally, the need for evaluation transparency is underlined by the students' right to know the academic grades received, the reasons they got them, and, as the case may be, the teachers acknowledging their mistake and intervening in order to mitigate its effects.

Research Focus

One of the vocational training options that many universities in Romania offer their students is the Psycho-pedagogy and Methodology Study Program, which, once completed allows its graduates to engage in pre-university and higher education teaching. The reasons that can persuade a student to opt for a teaching career are numerous. Some of them could be: the pleasure of working with other people (children, youth, etc.), the joy of sharing with others the knowledge gained, the desire to be always up to date with scientific field advancements, the distinguished status in the community, an attractive salary, flexible work schedule, extended vacations etc. (Pânişoară, 2017). Beyond the specialized psycho-pedagogical and methodical training, in order to become a good teacher, it is very important for the current student to develop those qualities that will allow them to become a professional and behavioral role model for their students. One can mention here an impeccable moral conduct, consistency in decision making, balance in managing interpersonal relationships, entrepreneurship, objectivity in evaluating students, honesty in self-assessing one's own academic and personal performance, etc. These qualities must be developed as early as possible, their perfection being achieved gradually throughout one's professional life, either formally (by going through continuous training programs) or informally (by judiciously internalizing readily available behavioral patterns or by intrinsic permanently motivated self-improvement) (Bradea, 2014).

In this context, the development of self-assessment/inter-assessment skills in students becomes a top priority. Among the benefits that an honest self-assessment can have on the person in question one can acknowledge: an accurate reporting of one's own performance in relation to those taken on through the training objectives and those of other individuals, an increase in self-confidence, self-knowledge and proper capitalization of one's own qualities, respectively the minimization of one's own limits, the responsible undertaking of one's status and role in the community, building-up a positive self-image, etc. The importance of developing such qualities is paramount not only for the student in question, but also for his future students, given the fact that he will become an educator. It is known that the best strategy to teach others is through personal example, and a teacher who exhibits trust and security can become an inspirational leader for his students (Blândul, 2015).

Therefore, the purpose of the present research was the analysis of the students' degree of awareness of the role of perceived self-efficacy in the formation of objective didactic self-evaluation skills. Furthermore, the need to study these teaching elements is all the greater as their acquisition by future teachers can give them a higher degree of security and confidence in relation to their professional careers and to their students.

Consequently, the research was centered upon how the students' level of perceived self-efficacy influences their academic performance, respectively their objective didactic self-assessment competencies.

Research Methodology

General Background

The actual research took place at the end of the second semester of the 2020 / 2021 academic year (June 2021) in the "Fundamentals of Pedagogy. The Theory and Methodology of the Curriculum" course of study, included in the curriculum of the Psycho-pedagogy and Methodology Study Program. The purpose of the present research was the analysis of the students' degree of awareness of the role of perceived self-efficacy in the formation of objective didactic self-evaluation skills. The authors applied, a didactic test with 12 items and a scale test with ten items. Following the application of these two tests, a number of 108 answers were given. In what follows we propose to present the obtained results for the 108 respondents. Also, we aim at testing the hypothesis that there are statistically significant differences between the level of self-efficacy perceived by students and their skills for self-assessment of school progress.

Sample

The research sample was made up of 108 first year students *(N=108)* attending the courses of the Psycho-pedagogy and Methodology Training Program offered by the University of Oradea, Romania. The sample size was obtained by adding the total number of students from four of the most relevant University of Oradea faculties participating in the study program. This program is separate from the other bachelors' or masters' degree programs, it is optional and unique within the entire university, and it can be attended by all students interested in a teaching career, regardless of the faculty in which they study. Out of a total of 15,000 students, currently attending the University of Oradea (16 faculties and departments), approximately 1,200 (8%) attend the courses of the aforementioned program, and the sample selected for the present research represents a percentage of 9% of all students enrolled. The sample can be considered statistically representative for the student population for which it was selected, namely 25% of the University of Oradea faculties. The selection procedure was conducted through random sampling using approximately 9% of the students enrolled in the Psycho-pedagogy and Methodology Study Program.

Instrument and Procedure

The research included two important stages: the analysis of the degree of development of students' didactic self-assessment competencies during the end of semester exam, respectively the administration of the Scale for measuring self-efficacy (Schwarzer & Jerusalem, 1995). The General Self-Efficacy Scale is correlated to emotion, optimism, and work satisfaction. Negative coefficients were found for depression, stress, health complaints, burnout, and anxiety. Thus, the examination of students in the afore-stated course of study was performed by administering a didactic test consisting of 12 items. The correction scale, respectively the scoring system was explained for each of these. After completing the test, the students were invited to self-assess the grade they thought they would get and argue their choice. In parallel, the students were asked to complete the Scale for measuring personal self-efficacy, according to the instructions given. The scale consisted of ten items, the student being able to award a range of points for each of them, starting from 1 point (very little) up to 5 points (very much). Following the addition of these values, the student could be placed in one of the following ranges: 1-10 (very low self-efficacy), 11-20 (low self-efficacy), 21-30 (moderate self-efficacy), 31-40 (high self-efficacy), respectively 41-50 (very high self-efficacy). The accomplishment of the two afore-stated work tasks was done nominally and voluntarily by each student participating in the research, this being necessary in order to be able to establish the association between the degree of objectivity of the didactic self-assessment and the level of perceived self-efficacy. Due to the COVID 19 pandemic, both the didactic test and the scale were administered online. Therefore, the two instruments were loaded into an online platform, dedicated to the course (www.e.uoradea.ro), the students having the option to download, solve, and upload them back again. After finalizing the loading process for the two instruments by the students, the authors centralized all the answers into an Excel document and processed them statistically, using the Data Analysis tool.

Data Analysis

The quantitative interpretation of the research data was made by comparative analysis of students' self-assessed grades and of those given by the teacher, respectively of the general statistical point-averages calculated for these two categories of academic grades, these values being related to the level of perceived self-efficacy obtained by the students following the administration of the scale. Following the analysis of the statistical data referring to the students' didactic self-evaluation in relation to the level of perceived self-efficacy, we aim at testing the relationship between the level of self-efficacy perceived by the students and their didactic self-evaluation competencies, materialized by the degree of objectivity of this approach.

For the present research, students from 4 such faculties were selected: the Faculty of Baptist Theology, within Emanuel University of Oradea (15 students, representing a percentage of 13.8% of all the students), the Faculty of Geography (27 students, representing a percentage of 25% of all the students), the Faculty of Physical Education (47 students, representing a percentage of 43.1% of all the students), respectively the Faculty of History (23 students, representing a percentage of 18.9% of all the students). Out of the students included in the research, 79 (73.1%) were female, and 29 (26.9%) were men, all aged between 19 and 22.

Research Results

Starting from the obtained data at the sample level, we would present the results of the didactic self-evaluation of the students, compared to the level of perceived self-efficacy of the students. The results will be presented individually for each faculty, followed by a comparison of the obtained results.

Table 1
Results of Faculty of Baptist Theology Students' Didactic Self-evaluation in Relation to the Level of Perceived Self-efficacy

Level of self-efficacy	*N*	%	Self-evaluation					
			Under-evaluation		Objective evaluation		Over-evaluation	
			N	%	*N*	%	*N*	%
Moderate	4	26.67	2	50	2	50	-	-
High	6	40	2	33.33	3	50	1	16.67
Very high	5	33.33	1	20	4	80	-	-
Total	15	100	5	33.33	9	60	1	6.67

Table 1 displays data regarding the number, respectively the percentage of Faculty of Baptist Theology students who undervalued, objectively evaluated, or overvalued themselves, undertaking thus a certain degree of perceived self-efficacy. Most students (60%) have objectively self-assessed their own exam readiness, 33.33% of the students undervalued themselves and only 1 student overvalued themselves. It should be noted that most of them scored high on the self-efficacy scale, which suggests that well-trained students also possess a high level of self-worth.

Table 2
Results of Faculty of Geography Students' Didactic Self-evaluation in Relation to the Level of Perceived Self-efficacy

Level of self-efficacy	*N*	%	Self-evaluation					
			Under-evaluation		Objective evaluation		Over-evaluation	
			N	%	*N*	%	*N*	%
Moderate	7	26.2	3	42.5	4	57.5	-	-
High	11	40.6	6	54.2	5	46.8	-	-
Very high	9	33.3	4	44.5	5	55.5	-	-
Total	27	100	13	43.4	14	56.6	-	-

The results displayed in Table 2 indicate that there is a fairly large number of Faculty of Geography students who underestimated themselves, respectively who undertook a moderate level of perceived self-efficacy. Furthermore, students possessing a high level of self-efficacy had a good ability for didactic self-assessment, being able to objectively assess their own skills developed in the pedagogical discipline studied.

Table 3
Results of Faculty of Physical Education Students' Didactic Self-evaluation in Relation to the Level of Perceived Self-efficacy

Level of self-efficacy	*N*	%	Self-evaluation					
			Under-evaluation		Objective evaluation		Over-evaluation	
			N	%	*N*	%	*N*	%
Moderate	9	19.4	7	77.8	1	11.1	1	11.1
High	23	48.3	9	39.1	12	52.1	2	8.8
Very high	15	32.8	3	20	12	80	-	-
Total	47	100	19	40.4	25	53.2	3	6.4

Similar results were obtained for the Faculty of Physical Education (Table 3). Most of the students (53.2%) self-assessed objectively for the examination, followed by the students who underestimated themselves (40.4%). Most respondents undertook a high level of perceived self-efficacy, demonstrating a high level of objective evaluation, while their peers who possessed a moderate level of self-efficacy were more likely to underestimate themselves.

Table 4
Results of Faculty of History Students' Didactic Self-evaluation in Relation to the Level of Perceived Self-efficacy

Level of self-efficacy	*N*	%	Self-evaluation					
			Under-evaluation		Objective evaluation		Over-evaluation	
			N	%	*N*	%	*N*	%
Moderate	3	14.1	2	66.66	1	33.34	-	-
High	14	60.8	6	42.8	7	50	1	7.2
Very high	6	25.1	-	-	6	100	-	-
Total	23	100	8	34.2	14	60.8	1	5

The Faculty of History students display both a high degree of objective didactic self-assessment skills and perceived self-efficacy (Table 4). Moreover, it has been noted that all students who have awarded themselves a high degree of self-efficacy can objectively assess their own exam readiness, while, of the three students who awarded themselves a moderate degree of personal self-efficacy, two have underestimated themselves.

The results seem encouraging, considering the context in which, after the first university year, most students demonstrate a good ability to self-assess their own academic performance. Some of the students' tendency to underestimate themselves can be interpreted in terms of insufficient preparation for the course of study in which the research was conducted. Given the fact that this is an optional course in relation to other specialized courses, there is also the risk of it being taken somewhat lightly. Furthermore, as it is a brand new and distinct study subject, unlike the rest, it requires a different set of competencies and a different approach as opposed to that applied to other subjects, deemed basic. On the other hand, the results obtained on the Scale for measuring self-efficacy show that most respondents have either a high or a very high degree of confidence regarding their self-worth. Interestingly, most students who have attributed themselves such high levels of personal effectiveness have objectively assessed their own academic performance, being aware of their own abilities and acting accordingly. These results can therefore be an important first indicator that a high level of perceived self-efficacy (displayed by self-confidence and a positive self-image) can be a relevant predictor for the development of didactic self-assessment skills.

Table 5
Self-assessed Academic Grades, Respectively Grades Received by the Students Included in the Research in Relation to the Level of Perceived Self-efficacy

Faculty	Level of perceived self-efficacy	Statistic point average of self-evaluated grades	Statistic point average of grades received
Baptist Theology	Moderate	8.50	9.00
	High	9.66	9.83
	Very high	9.40	9.80
Geography	Moderate	7.57	8.00
	High	7.95	8.45
	Very high	8.22	8.66
Physical education	Moderate	8.33	9.00
	High	8.60	8.91
	Very high	8.66	8.86
History	Moderate	8.00	8.66
	High	8.85	9.21
	Very high	9.16	9.16

Through analyzing the relationship established between the statistical point averages of self-assessed and real grades, received by the students for the exam taken in the previously stated course of study, compared to the level of perceived self-efficacy (table 5), some interesting observations can be deduced. First, the statistical point average of self-evaluated grades is lower than that of grades literally received by the students, which confirms the tendency of some of them to underestimate themselves. The academic grades received by the students were mostly good, considering that their statistical point averages were comprised between the interval of 8.00 – 9.83. The students' tendency to underestimate themselves can be demonstrated by the fact that the statistical point averages of self-assessed academic grades were comprised between the interval of 7.57 – 9.16. On the other hand, it can be noted that the students who possess the lowest degree of perceived self-efficacy, self-assess with the lowest academic grades and obtain the lowest academic performance (except for those from the Faculty of Physical Education). Also, the optimization of academic grades is directly proportional to the increase in the level of perceived self-efficacy only in what self-assessment is concerned, since, in relation to the actual academic grades obtained, there are some atypical cases. In other words, as students gradually improved their own self-image, they self-assessed with increasingly higher grades (except for the students in the Faculty of Baptist Theology). That, however, did not necessarily mean that they also got these same grades after the teacher's evaluation. The students with the highest level of perceived self-efficacy seem to also be the ones who self-assess the most objectively, the best example being that of those from the Faculty of History. Consequently, the analysis of these results reinforces the idea that the increased level of perceived self-efficacy contributes substantially to the development of students' didactic self-assessment skills, an increased level of self-esteem giving them confidence that they can achieve superior academic performance.

Table 6
Statistical Differences between the Level of Perceived Self-efficacy and Students' Didactic Self-evaluation Competencies

Indicator	Students' didactic self-evaluation competencies
Students' level of perceived self-efficacy	$\chi^2 = 34.548$
	$p = .385$

Resuming, the specific hypothesis of this research was that there are statistically significant differences between the level of self-efficacy perceived by the students and their skills to self-assess academic progress. Considering the results of the Chi-square test, presented in Table 6, it is safe to say that the null hypothesis cannot be rejected ($p = .385$), therefore, between the level of self-efficacy perceived by the students and their skills to self-assess academic progress, there are no statistical differences. These results statistically validate the preliminary findings according to which students' increased level of perceived self-efficacy leads to the optimization of their academic performance, respectively to the development of their didactic self-evaluation skills expressed by an increased degree of objectivity of this process. In point of fact, a student with confidence in his own abilities, possessing a strong self-image and self-esteem, respectively self-worth is able to tackle any learning task with the conviction that they can complete it successfully. In turn, one accomplishment leads to another and so the "virtuous circle" will "be able to soar" to a higher level. This is just one of the reasons why students need to be provided with as many favorable opportunities to demonstrate their own worth. Thus, their involvement in programs that contribute to the formation and development of their self-assessment skills can be a very good model.

Discussion

The first feature that can be discussed refers to the stages to be gone through by the students in order to develop self-assessment skills of academic progress. The results obtained in this research confirmed the findings of Sera and McPherson (2019) students with the highest academic performance have the highest degree of perceived self-efficacy, respectively self-assess most objectively. These students have become aware of their own value and their school behavior mirrors that, their academic success contributing to the development of self-esteem and encouraging them to relate correctly to the requirements of the teacher and their own performance, respectively the requirements of those around. At the other end of the spectrum are students with modest academic performance, possessing insufficient confidence in their own worth, implicitly prone to the tendency to underestimate themselves. This is one of the reasons why it is recommended to give students the opportunity to demonstrate their own abilities through curricular and extracurricular activities, which will allow them to achieve various accomplishments, develop self-esteem and self-efficacy and, finally evaluate themselves as objectively as possible.

A second important aspect to be discussed is the increased degree of subjectivity of didactic evaluations made through the use of online tools. In point of fact, both common sense and certain psycho-pedagogy specialists (Guțu & Vicol, 2014; Marinescu, 2021) bring up the tendency of underestimating students through on-line examination strategies, bringing as the main justification the fact that the teacher cannot verify the actual identity of the individual who solved the assessment task and the general conditions in which this process was carried out. Other authors (Kaur et al., 2020; Moffitt et al., 2019) discuss a number of psycho-individual factors that may influence student performance in terms of distance assessment, among which could be mentioned: the individual's mood at the time of solving the assessment task; the time of day this occurred, the preference for this mode of assessment given by the increased degree of psycho-emotional comfort felt by students at the time of the exam, etc. It can also be added that the examination is not taken in the same conditions by all students, each of them having the freedom to decide when and how much time they are willing to devote to this activity (Petrovan, 2015). Due to the COVID 19 pandemic, the 108 subjects of this research were evaluated online, which increased the degree of subjectivity of this process. However, the results of this research show that these limits can be minimized through a high degree of personal self-efficacy for each student. The results analyzed in the previous paragraphs indicate that students possessing a high degree of personal self-efficacy have better developed didactic self-assessment skills, while those with a lower degree of self-confidence most often either underestimate or overestimate themselves. It follows from here that, beyond reducing as much as possible the influences of the factors stated in the psycho-pedagogical literature, in order to ensure an objective didactic evaluation which is congruent with the students' assessment, it is important to engage them in educational activities that develop their self-esteem and self-awareness (Maier, 2014).

Conclusions

It can be ascertained that the formation of self-assessment skills in students constitutes a complex and long-lasting process involving both characteristics related to their psycho-intellectual and psycho-emotional development, as well as to the design and implementation of the educational process. If in the first case we can discuss the role played by the chronological age, the stage of intellectual development, the student's perceived self-efficacy or motivation for learning, in the second instance we should focus on an instructive-educational process supported by an active, conscious, and responsible participation. of the learner in his own development.

The results of the present research indicate that the majority of the students included in the sample either tend to evaluate themselves objectively or underestimate themselves in the exams for the courses of study included in the curriculum of the Training Program in Psycho-pedagogy and Methodology. On the other hand, the same subjects attribute themselves a high level of personal self-efficacy, an element that matches with the academic grades received for the exam we specified. Moreover, students with a very high level of perceived self-efficacy demonstrate superior self-assessment skills, as demonstrated by an objective assessment of their own academic performance. These students seem to be aware of their own professional and personal value, have confidence in their own abilities and are willing to take on learning tasks that they can successfully complete.

In this article, the main psycho-pedagogical factors that can mediate the relationship between perceived self-efficacy and didactic self-assessment competencies in students have been analyzed. The directions of research that can be developed from here include elements such as the study of the social factors that influence the specified relationship, considering the fact that the academic results of the school group can significantly influence the normative self-evaluation of the students. Another direction of study could be how non-formal education (achieved by involving students in extracurricular activities) can influence the level of perceived self-efficacy and, implicitly, the development of didactic self-evaluation skills, given the influence of a positive psycho-affective state on these processes. A future possibility of replicating this research would be to include in the study both students from other Romanian and foreign universities, thus being able to perform a comparative analysis between the objectivity of Romanian and foreign students with reference to the evaluation of their own academic performance. The benefits of such in-depth investigations are obvious, as an objective self-assessment set against a background of high self-efficacy can contribute to optimizing students' academic performance and to improving their integration into academic and, subsequently into socio-professional environments.

Declaration of Interest

Authors declare no competing interest.

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CLASSROOM CLIMATE AND STUDENT SELF-EFFICACY IN E-LEARNING

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Abstract

The last two decades have seen significant growth in e-Learning in many institutions, with the main growth engine being significant development of technologies providing access to information. These technologies have dramatically changed how societies and individuals communicate. The current study examined whether the paradigm of good teaching dimensions customary in the research literature can predict students' self-efficacy and social-academic climate in e-Learning. For this purpose, 147 students from different academic institutions were sampled and asked to choose one course they had studied online, completing a questionnaire on their experience of the course. The questionnaire was divided into four sub-topics, where at first the participants were asked to answer several demographic questions and the rest of the questions were divided by the research variables as follows: the first group of questions dealt with perceived self-efficacy; the second group dealt with the teaching dimensions presented in Hativa's (2015) theory, from which select teaching behaviors were extracted. In the final part, the questionnaire examined the social-academic climate during the course. The research results show correlations between the research variables and some of the demographic variables. The higher the respondent's age and years of schooling, the higher the lecturer's evaluation. Furthermore, men were found to rank lecturers on teaching dimensions significantly lower than did women. Respondent self-efficacy rose with age and years of schooling. Moreover, the higher the participants' age, the more positive the climate reported, and women tended to rank classroom climate higher than did men.

Keywords: *classroom climate, e-Learning, self-efficacy, teaching dimensions*

Introduction

Classroom Climate and Student Self-Efficacy in E-Learning

Various technological developments that support distance learning allow learning at anytime and anywhere, meaning that learners encounter fewer restrictions and can adapt the learning to their needs. One of the most preferred and customary options of e-teaching is learning by video conference. An example of a technology that offers video conferencing services is the Zoom platform, which enables active participation by the lecturer and students. At present, this technology has become one of the most common methods utilized in academia.

E-Learning and Education

The history of e-Learning cannot be separated from the general history of education. The first milestone in the history of distance learning occurred after the industrial revolution in the 19th century, when the procedure was based mainly on sending study material to students by mail. Several universities in developed countries such as the US, the UK, and Canada, allowed academic studies in this method. The use of distance learning afforded many institutions a significant income, with no need to provide students with residential and other conditions (Sumner, 2000). However, with the development of technological tools and new means of instruction, this method, which utilized delivery of study material by mail, became outdated.

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The second generation of distance learning did not make do with printed material and mail services, rather included utilization of broadcast media, cassettes, and in some programs also computers (Nipper, 1989).

Technological advancements afford many new opportunities, but the wish to cover a large quantity of study material and the need to reach a large number of students has come at the expense of the study experience and quality (Sumner, 2000), the lecturer-student interaction, and interactions among the students (Nipper, 1989). In order to overcome these weaknesses, the second generation of distance learning provided several options that contributed to its development and growth: new communication technologies, increasing sophistication in use of printed material, improvement of support services for students in distance learning, and establishment of the Open University in the UK in 1969. The Open University marked the second generation of distance learning and had an impact on many institutions over the years. More than any other event, its establishment was perceived as the beginning of a more prestigious era in the history of distance education (Homberg, 1986).

By the beginning of the 21st century the information era was already in full blast. The main feature of this era with regard to the possibility of transferring information very rapidly was the computer (Menzies, 1996). Use of rapid transfer of information is typical of almost all aspects of life in the western world, including distance learning (Spencer, 1998). The experience of independent distance learning was implemented in the new era mainly by use of the internet. Modular courses, self-paced exams, CDs, and various websites added a large quantity of information for students but were unable to provide the social interaction and interpersonal communication essential for learning. In addition, a platform that began to evolve in this era is, as stated, video conferencing, which is capable of providing active communication (Sumner, 2000). The technologies currently being used for e-Learning are considered the next generation of distance learning (Davidovitch & Cohen, 2020).

Considering the great popularity of online communication and social media among the students, it seems inevitable that education also proceeds in that direction, but not everyone accepts this (Redpath, 2012). Many leading faculty members in higher education tend to underestimate e-Learning and are even concerned of integrating it in the academic institutions they run (McCarthy & Samors, 2009).

In early 2020 a change was evident in the popular attitude to distance learning; in this year the Covid-19 virus began to spread. The virus appeared in November 2019 in the city of Wuhan, China, and quickly spread to many countries around the world. The virus spreads rapidly and attacks the respiratory system, with possibly fatal results for humans (Zaharah et al., 2020). This pandemic posed significant challenges for institutions of higher education around the world. One of the conspicuous challenges was evident in the urgent and unexpected need to shift all courses to e-Learning, although previously held face-to-face at universities (Rapanta et al., 2020).

Teaching Dimensions

The quest for excellence in college and university teaching has become very popular throughout the world. Many academic institutions devote a great deal of attention to the pedagogic standards in their classrooms and to evaluating teaching (Ovando, 1989). At the same time, various educators and researchers are seeking how to enhance knowledge on the efficacy of teaching in general and of digital teaching in particular. A good way of achieving this goal is by learning how good lecturers think about teaching and about their pedagogic knowledge, while stressing their teaching behaviors in class (Hativa et al., 1999). Improving teaching behaviors, such as by replacing inefficient teaching strategies and techniques, is a major component in the teacher's process of becoming a better teacher (Erickson & Erickson, 1980; Levinson et al., 1981; Weimer & Lenze, 1991). This is because the very focus on teaching behaviors classified as problematic is sufficient in order to improve teaching (Marsh & Roche, 1993).

Efficient teaching requires a wide knowledge base, including in the following areas: general pedagogic knowledge, knowledge about the students (student characteristics, learning and motivation theories), knowledge of the context, knowledge of pedagogic goals, as well as strong command of the study material (Gudmundsdottir, 1987; Shulman, 1986; Shulman, 1987). There is extensive research literature on conceptions of teaching and knowledge. Novice and expert teachers in schools have been compared, and this literature has generated evidence indicating that expert teachers are distinct from their colleagues, and particularly from novice teachers, in the complexity and sophistication of their teaching conceptions (Gudmundsdottir, 1987). Exemplary teachers in their field combine various categories and forms of knowledge in a way that allows them to optimally construct the physical, social, and intellectual classroom environment (Hativa et al., 1999). Similar evidence was also found in tertiary institutions, where exemplary teachers were found to be very organized, carefully plan their lessons, set unambiguous goals, and report high expectations of their students. They displayed a positive attitude towards the students, promoted student participation in class, provided them with regular feedback on their progress in the course, gave specific suggestions for improvement, and took considerable responsibility for the students' achievements. In addition, these lecturers made the material studied relevant by linking it to student experiences, while providing examples and setting defined goals such that the knowledge acquired would be applicable in their life (Horan, 1991). Exemplary lecturers provide students with individual treatment, involve them in the learning process, encourage them, utilize a variety of teaching techniques in order to generate more interest, challenge them intellectually, and create a positive classroom atmosphere (Hilgemann & Blodget, 1991). Exemplary teachers enjoy teaching, display enthusiasm with the material, have good command of language, and provide clear access to the material, while adding humor and theatrical elements to their teaching. They make a true effort to advance students' learning and make sure that these take an active part in the lesson through questions and discussions (Kelly & Kelly, 1982).

Hativa (1984, 1999, 2015) found that studies examining students' perception of good teaching can be divided into two main categories: In the first category, students are asked to choose the most important features of good teaching in their opinion from among given options. The second category in this type of studies accesses students' views on good teaching indirectly, by statistical analyses of student evaluations of their teachers. These analyses are used by the researchers to reach conclusions about specific features. In her studies, Hativa examined good teaching of math as perceived by undergraduate students using these two research methods. The most important feature of the lecturer as perceived by the students was found to be the ability to provide clear and organized lectures. Nevertheless, it is notable that these qualities are appreciated more by students of math and science than by students of social sciences, humanities, and the arts. In addition, it was found that a good lecturer can convey a large amount of material clearly and in a manner that is well-adapted to the students and does not skip relevant study material in the assumption that the students will make up the difference themselves. At the same time, the students reported that the lecturer makes a point of slightly deviating from the topic from time to time in order to arouse interest and curiosity. In addition, the research participants ranked the lecturer's enthusiasm low. It appears that these students do not ascribe significance to this feature and do not perceive it as important for their learning process, apparently because it does not affect the clarity and organization of the lesson. The students in the study attested that a good relationship with the lecturer is very important for them and ranked this feature as being highly significant in a good lecturer. These students appear to have more appreciation than others for qualities such as lecturer empathy and help, as affecting their difficulties with the learning process (Hativa, 1984).

Through many observations and various statistical tests, Hativa developed a model that contains leading dimensions of good teaching as well as primary teaching behaviors found essential for exemplary lecturers, as perceived by students. According to this model, the teaching capabilities of a good teacher are comprised of two main dimensions: the cognitive dimension, involving delivery of the material, and the affective dimension, involving the classroom atmosphere (Hativa, 2015).

The cognitive dimension is comprised of three main teaching categories: First, organization of the course and the lesson by the teacher; namely, seeing to it that the student is well aware of the course framework, knows the topic addressed by the lecturer in a given lesson, that of the previous lesson, and what will happen subsequently. Second, the lesson is clear; namely, the teacher teaches the lesson clearly, with explanations that allow the students to further apply them beyond school hours. Third, the lesson is interesting and maintains concentration and attention; namely, the students remain concentrated and involved during the lesson (Hativa, 2015).

The affective dimension is manifested by creating a positive and comfortable class atmosphere that promotes openness and motivation to learn and it is comprised of two main categories of teaching behaviors: The first is displaying respect for the students, empathy for their learning difficulties, providing help, and demonstrating a warm and sympathetic attitude to the students. The essence of the second category is maintaining positive and beneficial interactions with the students, encouraging their inquisitiveness and questions, and providing relevant solutions. All the teacher's primary behaviors constitute potential behaviors utilized by the teacher in the lesson (Hativa, 2015).

Classroom Climate

The climate of the study setting, i.e., the classroom climate, is comprised of the atmosphere among the teacher staff, between the teacher and the management, and between the teachers and students, and it serves as the academic environment of the learning process. It constitutes an important part of the school's values (Friedman, 1995). Classroom climate changes form according to the student-teacher dynamics (Smith et al., 2001) and is affected by demography, prejudices, general views on different topics, etc. (Ambrose et al., 2010). Moreover, the climate is also affected by the nationalities, ethnicities, and faiths of both teachers and students (Stein, 2001). Classroom climate includes the intellectual, social, emotional, and physical environment of the students (Ambrose et al., 2010).

The climate concept can be divided in two: the learning environment and the teaching. The learning environment encompasses all the elements that comprise the academic expanse, beginning from desks and chairs, the study program, the content of the lessons, to the encounters between the students and the teaching staff (Schubert, 1986). The teaching dimension includes all the elements that affect the teacher as well as the students' performance (Fraser & Waldberg, 1991; Fraser, 1989). Tzidkiyahu (1983) explains that classroom climate is comprised of four dimensions: behavior and thinking that are open to change, by both the teachers and the students; teacher assistance provided to the student and assistance among the students; equal treatment of all students by the teacher and among all students; and laws and orders that are familiar to both the teacher and the students (Tzidkiyahu, 1983). Classroom climate can be maximally realized when all the needs of the class students are met and students have a sensation of physical, mental, and social stability (Williams et al., 1998).

It is customary to relate to the classroom climate also as the social-academic climate, a term that relates to how students and teachers perceive the quality of their experiences in the classroom. It is suggested that their feelings are projected on the class (Hoy & Miskel, 2012). There is extensive research literature on the contribution of the classroom social climate to the student's academic achievements and emotional state (Mashburn et al., 2008; Pianta et al., 2008; Somersalo et al., 2002; Wilson et al., 2007). Positive classroom climate has been found to help increase student motivation (Makara & Madjar, 2015; Martin et al., 2012), meet psychological needs such as autonomy, capability, and affiliation (Deci & Ryan, 2016), and also encourage learning and improve academic achievements (Ainley & Ainley, 2011; Parra, 2010). According to Davidovitch (2004), a social-academic climate provides individual attention and constitutes a safe space for the development of students' self-efficacy. The literature (e.g., Ainley & Ainley, 2011; Makara & Madjar, 2015; Martin et al., 2012 Parra, 2010) indicates that positive classroom climate helps increase students' motivation, which may improve academic achievements and, in turn, increase self-efficacy.

A study from 2016 found that social-academic climate constituted one of the most significant predictors of emotional functioning, which in turn was a significant cause of academic achievements. Hence, teachers may need guidance on how to create a positive social-emotional climate in order to improve academic performance (López & Oriol, 2016).

Academic climate is influenced at the same time also by social interactions that occur within the learning expanse. These occurrences as a whole are often called the "social-academic climate", meaning the interaction between the student's perceived self-efficacy and a range of social features within the school. In classrooms where most students have a high socioeconomic status, the academic climate was found to be high as well, as was the students' perceived self-efficacy and achievements. Givens-Rolland (2012) found that classroom climate depends on a range of elements, including self-efficacy, which influences the class setup. A possible explanation of these findings is that high academic functioning is partially based on the atmosphere in the study environment, and hence on students' academic efforts. Students who perceived themselves as capable of learning also reported high perceived self-efficacy (Schaedel, 2020).

Factors Affecting the Social-Academic Climate

Students spend most of their school hours with other students and often also in collaboration with them, influencing their classmates and influenced by them (Holen et al., 2013). The classroom climate depends on an array of factors, which include self-efficacy and social-emotional factors that affect the class setup (Givens-Rolland, 2012), as well as social, cultural, and pedagogical factors. While sociocultural factors affect academic achievements (Hodis, 2011), they are not easy to change within the classroom, unlike pedagogical factors that can be changed both in the classroom and in the overall school system by developing motivation (Gutiérrez et al., 2011), encouraging autonomy (Puigarnau et al., 2016), fostering responsibility (Moreno et al., 2010), reducing violence (Alvarez et al., 2011), and meeting basic psychological needs (Moreno et al., 2012). Some researchers are of the opinion that fully meeting needs helps one grow and develop and is beneficial for mental health, while not meeting needs might generate boredom, social segregation, and a narrowing of horizons (Ryan & Deci, 2000). Accordingly, the classroom climate is supposed to provide students with all their needs in this setting (Larson, 2000). In schools where the focus was on strengthening positive relationships between students and teachers (Osler, 2000) and cultivating a sense of mutual trust and respect between teachers and students, the classroom climate improved accordingly (Marshall, 2004).

The teacher's teaching style has an impact on the classroom climate as well. Some claim that the type of teaching style can be divided in two: a teacher-centered instruction style and a learner-centered teaching style. The teacher-centered style focuses on the teaching (Brown, 2009; Pratt, 2002). This teaching style is aimed mainly at providing access to information, where teaching and maintaining the study program are given priority over students' needs.

Then there is the learner-centered teaching style, characterized by an emphasis on the student, the student's needs, and the learning process. A learner-centered classroom climate puts the student at the center of the learning process and grants the student support and guidance, positive feedback, encouragement, empathy, as well as mutual trust and respect (Pratt, 2002). The teacher's inclination towards a teacher- or learner-centered teaching style might shape and reflect the classroom climate and thus affect the students' self-efficacy and achievements (Eggen & Kauchak, 2007). This was also found in a study from 2004, showing that a social-academic climate that provides individual attention and support constitutes safe grounds for the development of self-efficacy among the students. Moreover, differences in this climate were found between various institutions and academic departments (Davidovitch, 2004).

One of the main roles of the learner-centered educator is to establish positive teacher-student relations that nurture the student's self-confidence and self-efficacy. Accordingly, learner-centered teachers strive to enhance their students' self-efficacy and aim to maintain a balance between trust in the students and helping them to achieve their academic goals (Pratt, 2002). In this context, studies have found that students who perceived their teacher as caring and supportive tended to have higher motivation, manifested in investing efforts and perseverance, features that in turn increased the likelihood that these students would do well (Lumpkin, 2007; Wentzel, 1997).

Self-Efficacy

Bandura was the first to introduce the concept of self-efficacy and he defined it as the individual's belief in his abilities to organize and execute the necessary actions in order to achieve something. Self-efficacy as belief in one's personal ability affects human behavior in various ways. Bandura assumed that self-efficacy affects the decisions people reach, their nature, the extent of the resources spent, persistence in them, and flexibility (Bandura, 1977). Self-efficacy is multi-dimensional and might change according to the type of task and its context as well as its difficulty. Hence, self-efficacy is a dynamic quality that changes according to the learner's different fields of activity (Bandura, 1997).

People tend to choose activities in which they feel capable and to avoid activities in which they do not feel capable. Self-efficacy helps people decide how much effort they will have to devote to a given task, how much time they will have to spend when encountering difficulties, and how much resilience they will have to demonstrate in moments of crisis. The more they perceive themselves as capable, the greater their efforts, perseverance, and flexibility (Bandura, 1986).

Beyond its effect on human behavior, individuals' self-efficacy also affects their thoughts and feelings. Individuals with low self-efficacy tend to assess tasks as harder than they really are. These thoughts are fertile ground for perceived failure, tension, helplessness, and even depression. In contrast, strong self-efficacy grants a sense of calm and challenge when carrying out a complicated task. Based on this argument, Bandura claimed that self-efficacy has a key role in human agency (Bandura, 1997).

Self-Efficacy in Education

In recent decades, the concept of self-efficacy has been widely studied in the educational context. Many researchers examined the effect of self-efficacy on motivation and learning among students. These findings suggest that self-efficacy affects motivation and cognition by influencing the interest students display in executing a task, their perseverance, the goals they set, their decision making, and their use of cognitive and meta-cognitive strategies, as well as their self-monitoring (Bouffard-Bouchard, 1990; Bouffard-Bouchard et al., 1991; Lent et al., 2002; Linnenbrink & Pintrich, 2003; Pintrich & Groot, 1990; Schunk, 2003; Zimmerman et al., 1992). Accordingly, the student's self-efficacy mediates between several aspects related to capability (skills, knowledge, prior achievements, etc.) and consequent performance (Bandura, 2006; Schunk & Pajares, 2002).

According to the social-cognitive theory of learning, there are four main sources that facilitate self-efficacy: practicing skills, observing others, social persuasion, and one's physiological and psychological state (Bandura, 1997). Practicing skills constitutes the most significant source for forming a sense of self-efficacy, because it provides students with authentic evidence that they are capable of handling a task (Palmer, 2006). Students interpret the results of their actions and utilize this interpretation in order to develop beliefs regarding their ability to carry out tasks and activities. As a rule, success facilitates a strong sense of self-efficacy and failure weakens it, particularly when the individual fails before forming a strong and stable sense of self-efficacy. However, the development of strong self-efficacy is based not only on success but rather requires experiences of overcoming obstacles through effort and persistence (Bandura, 1997). The second source is, as stated, observing the experiences of others (Bandura, 1997). The students receive information regarding their abilities by observing others, particularly in their peer group, which provides natural opportunities for comparison (Schunk, 1987).

A survey from 2011 that focused on the self-efficacy of students at institutions of higher education found several techniques used by the lecturer that help increase self-efficacy. First, it was found that when the lecturer taught new contents and then opened them to discussion while asking questions and stimulating the students to remember the contents, their sense of proficiency grew. Second, when the lecturer followed the student's progress, pointing out possible mistakes and offering additional approaches and angles, this encouraged the development of a sense of proficiency. Third, a lecturer who encouraged the students to answer questions and raise ideas and suggestions while urging them to be goal-focused and persist, helped preserve positive emotional arousal. In summary, experiences in which students develop a good command of their skills were found to be the most important source for creating a stable sense of self-efficacy. The explanation given by the researchers was that almost all the studies surveyed in the article, which emphasized the significance of exposing students to practical experiences and development of skills, found the greatest improvement in the enhancement of self-efficacy (van Dinther et al., 2011). The current study examined whether the paradigm of good teaching dimensions customary in the research literature could predict students' self-efficacy and social-academic climate in e-Learning.

Hence, the purpose of the current study was to examine whether and to what degree there was an association between the two teaching dimensions: the cognitive and the affective, and between self-efficacy and the social-academic climate of students engaged in e-Learning. Namely, the current study examined whether the teaching style utilized by the lecturer might predict students' perceived efficacy and social-academic climate when studies are carried out remotely via online technologies.

Hypotheses

- There is a positive correlation between the teaching dimensions and the social-academic climate, such that participants who rank the lecturer high on instruction behaviors will report a positive social-academic climate.
- The teaching dimensions are positively correlated with self-efficacy, such that participants who rank the lecturer high on instruction behaviors will report high self-efficacy.
- Of the categories in the cognitive teaching dimension, "lesson clarity" is the strongest

predictor of self-efficacy, such that students who report a clear and logical lesson will also report high self-efficacy.

- Of the categories in the affective teaching dimension, the lecturer's ability to grant respect, empathy, and support best predicts self-efficacy, such that reporting high empathy and respect by the lecturer will be accompanied by reports of high perceived self-efficacy.
- There is a positive correlation between social-academic climate and self-efficacy, such that participants who report a positive and pleasant atmosphere will also report high self-efficacy.

Research Methodology

After a comprehensive and extensive search in the research literature in this field, no study was found to have applied Hativa's (2015) model of overall dimensions and main behaviors of good teaching" to the area of e-Learning. In light of the technological transformations occurring around the world in recent decades, which are also evident in the domain of education and teaching, the current study that was conducted in 2020-2021, seeks to expand this theory to the area of e-Learning as well, in order to help educators, maximize their abilities to teach remotely.

Research Variables

Demographic Variables

Age, gender, marital status, residential area, years of schooling, academic institution, faculty, and current year of studies.

Independent Variables

Cognitive and affective teaching dimensions.

Dependent Variables

Social-academic climate and perceived self-efficacy

Participants

The study consisted of 152 respondents, of whom four were removed from the data analysis because they were not academic students, rather had only a high school education. Of all the students, 105 were female (71.4%). The age range was 21-61 ($M = 28.3$, $SD = 7.72$). The participants were recruited with non-probabilistic sampling by distributing the questionnaire in its electronic form among students from all over the country, through a snowball sampling method. Before answering the questions, the participants were asked to give their consent to participate in the study on a volunteer basis, by marking "confirm participation." Table 1 presents the sociodemographic data of the research participants.

Table 1
Sociodemographic Data of the Research Participants

Variable	Number of respondents	Percentage	Mean (±Standard Deviation)	Min.	Max.
Gender					
Female	105	71.4			
Male	42	28.6			
Age (years)	147		28.3 (±7.72)	21	61
Marital status					
Single	99	67.3			
Married	43	29.3			
Divorced	5	3.4			
Residential area					
Northern district	8	5.4			
Central district	4	2.7			
Haifa district	93	63.3			
Tel Aviv district	15	10.2			
Jerusalem district	9	6.1			
Southern district	6	4.1			
Judea and Samaria	12	8.2			
Years of schooling	147		14.44 (±2.34)	12	25
Academic institution					
University	100	68			
College	45	30.6			
Faculty					
Social sciences and humanities	106	72.1			
Engineering	17	11.6			
Medicine	5	3.4			
Law	3	2			
Exact sciences	8	5.4			
Current year of studies					
First	28	19			
Second	44	29.9			
Third	35	23.8			
Fourth	19	12.9			
Master’s degree	6	4.1			
Preparatory program	7	4.8			

Instruments

The research participants were asked to complete one questionnaire comprised of 36 questions. The statements were written by the current authors based on the research literature in this area. The questionnaire was divided into four parts, where each examined a certain variable. The first part of the questionnaire collected the demographic data of the research participants and included eight items. The second part also included eight items that examined the student’s perceived self-efficacy (for instance, “I am able to keep up with the pace of teaching in class”; “I feel that I am unable to learn the material in the online course”).

The third part of the questionnaire dealt with the lecturer’s teaching style according to Hativa’s (2015) theory of teaching dimensions, such that each statement dealt with one dimension found to characterize the exemplary student. This part included ten items divided in two: the first six dealt with the cognitive dimension (for instance, "The material is conveyed in an organized and continuous manner"; "The lecturer explains his words clearly"), while the four last items focused on the affective dimension (for instance, "The lecturer encourages the students to ask questions"; "The lecturer displays respect and empathy for the students"). The fourth and last part of the questionnaire included ten items that represented the social-academic climate in the course (for instance, "I feel that I am among equals"; "The students in the course befriend each other"). The questionnaire was comprised of various statements and the research participants were asked to note their support for each statement on a range of 1 (*strongly disagree*) to 7 (*very strongly agree*). Items 14, 15, 29, 42, and 34 were formulated as inverse items in order to retain the participants' attention and check for unreliable responses to the questionnaire.

Procedure

The questionnaire was administered and completed online using Google Forms website. The opening section clarified to the participants that the questionnaire is anonymous and although written in the male form appeals to both genders. Each subtopic opened with an explanation of how to respond to the statements and upon completing the full questionnaire the participants were thanked and told that their responses had been recorded in the system.

In order to explore this question, students from various institutions of higher education in Israel completed a questionnaire where they were asked to choose one course they had studied online and focus on it when responding to the questionnaire. The questionnaire was divided into four sub-topics, where at first the participants were asked to answer several demographic questions and the rest of the questions were divided by the research variables as follows: the first group of questions dealt with perceived self-efficacy; the second group with the teaching dimensions presented in Hativa's (2015) theory, from which select teaching behaviors were extracted. In the final part the questionnaire examined the social-academic climate during the course.

Data Analysis

In order to examine the hypotheses, several statistical analyses were conducted. First, a descriptive statistics analysis was performed for all the demographic variables. In addition, for each group of questions regarding social-academic climate, self-efficacy, and teaching dimensions, a Cronbach's alpha test was conducted in order to evaluate reliability as internal consistency. In order to examine hypotheses 1, 2, and 5, Pearson correlations were conducted. In order to examine hypotheses 3 and 4, multiple linear regression analyses of the hierarchical regression type were conducted. In order to rule out alternate explanations, Pearson correlations were conducted among the three research variables for the quantitative demographic variables (age and years of schooling), and a Chi-square analysis for independence (Cramer's V) for the research variables and the categorical demographic variables (gender, marital status, place of residence, academic institution, faculty, and years of schooling). However, with regard to these variables, in each of the Chi-square tables more than 20% of the cells had an expected value of less than 5, so this test could not be relied upon and therefore a Pearson's test was held too for these variables, where each category in the variables was given a numerical value (for instance, female – 1, male – 2) in order to allow a Pearson's correlation.

Reliability

In order to examine the reliability of the tools, a Cronbach's alpha reliability test for internal consistency was conducted. For this purpose, the questionnaire statements were divided in two according to the three research variables (teaching dimensions, perceived self-efficacy, and classroom climate). The reliability of the tools for measuring perceived self-efficacy and teaching dimensions was found to be very high, while the reliability of the tool for measuring classroom climate was found to be medium. Table 1 presents the values of the internal reliability measure (Cronbach's α) for each of the tools.

Table 2
Internal Reliability (Cronbach's α)

Variable	Statements	Range	Inverse Statements	Alpha Value
Self-efficacy	1-8	1-7	6,7	848.
Teaching dimensions	9-18	1-7		899.
Social-academic (classroom) climate	19-28	1-7	3,6,8	620.

Research Results

In order to rule out the possibility that the demographic variables had influenced the research variables, Pearson correlations were calculated between the research variables and the sociodemographic variable. Table 3 presents a matrix of the Pearson correlations between the variables ($N = 147$).

Table 3
Matrix of the Pearson Correlations between the Variables (N=147)

Variable	Teaching dimensions	Self-efficacy	Social-academic climate
Sex	-.166*	-.091	-.291**
Age	.166*	.198*	.287**
Marital status	.110	-.012	.072
Years of schooling	.198*	.257**	.166
Residential area	.127	-.070	-.010
Academic institution	-.089	-.137	-.098
Faculty	-.024	.021	-.149
Year of studies	-.099	-.068	-.093

Table 4
Statistics for the Three Research Variables

Variable	Mean (±Standard Deviation)	Minimum	Maximum
Teaching dimensions	5.330 (±1.014)	3.10	7.00
Self-efficacy	5.009 (±1.102)	1.75	7.00
Classroom climate	4.975 (±0.814)	3.00	7.00

In order to examine the first research hypothesis, whereby there is a positive correlation between the teaching dimensions and the social-academic (classroom) climate, a Pearson's correlation between the two variables was calculated. Confirming the research hypothesis, a significant positive correlation was found ($r = .608, p < .001$). Namely, participants who ranked the lecturer high on teaching behaviors also reported a positive social-academic climate.

In order to examine the second research hypothesis, whereby there is a positive correlation between the teaching dimensions and self-efficacy, a Pearson's correlation was calculated. This hypothesis too was confirmed by the data ($r = .549$, $p < .001$). Therefore, participants who ranked the lecturer high on teaching behaviors also reported high self-efficacy.

In order to examine the third research hypothesis, whereby of all the categories of the cognitive teaching dimension, "lesson clarity" is the strongest predictor of self-efficacy – a multiple linear regression analysis of the hierarchical regression type was conducted between self-efficacy and the three teaching categories in the cognitive dimension. This hypothesis was supported by the findings. First, the cognitive teaching dimension was found to explain 35% of the explained variance in the variable of self-efficacy ($R^2 = .346$, $F(2,143) = 37.87$, $p < .001$). in this dimension, the category of lesson clarity was found to be the strongest predictor of self-efficacy ($\beta = .348$, $p > .001$). The category of interesting lesson that engages concentration and attention was found to have the second next significant unique contribution to predicting self-efficacy ($\beta = .316$, $p > .001$). No significant unique contribution was found for the category of teacher organization of the course and the lesson ($\beta = .003$, $p = .977$). Table 5 presents a hierarchical regression analysis of the categories in the cognitive teaching dimension as predictors of self-efficacy.

Table 5
Hierarchical Regression Analysis of the Cognitive Teaching Dimension Categories as Predictors of Self-Efficacy

	Model 1				Model 2			
Cognitive teaching dimension	*B*	*SE B*	β	*t*	*B*	*SE B*	β	*t*
Lesson clarity	.469	.063	.528**	7.468	.309	.073	.348**	4.218
Interesting lesson that promotes concentration and engages attention					.236	.062	.316**	3.831
Lecturer's organization of the course and the lesson								
R²	.279**				.346**			
F change	**55.769				**14.679			

*$p < .05$. **$p < .01$

In order to examine the fourth hypothesis, whereby of all categories of the affective teaching dimension, that of respect, empathy, and support by the lecturer most strongly predicts self-efficacy – a multiple linear regression analysis of the hierarchical regression type was conducted between the variable of self-efficacy and the two categories in the affective teaching dimension. This hypothesis too was confirmed by the findings. The category of respect, empathy, and support by the researcher was found to explain 16% of the explained variance in the variable of self-efficacy ($R^2 = .162$, $F(1,144) = 27.83$, $p < .001$). This category was found to have a unique contribution to predicting self-efficacy ($\beta = .402$, $p > .001$). In addition, the category of creating positive and beneficial interactions with the students was not found to have a significant unique contribution to predicting self-efficacy ($\beta = .042$, $p = .702$). Table 6 presents a hierarchical regression analysis for the categories in the affective teaching dimension as predictors of self-efficacy.

Table 6
Hierarchical Regression Analysis for the Affective Teaching Dimension Categories as Predictors of Self-Efficacy

	Model 1			
Affective teaching dimension	*B*	*SE B*	β	*t*
Respect, empathy, and support by the lecturer	.411	.078	.402**	5.275
Creating positive and beneficial interactions with the students				
R^2		.162**		
F change		**27.830		

*$p < .05$. **$p < .01$

In order to examine the fifth research hypothesis, whereby there is a positive correlation between classroom climate and self-efficacy, a Pearson's test was conducted between the two variables. A positive significant correlation ($r = .502$, $p < .001$) was found and therefore the hypothesis was confirmed, such that participants who reported a positive and pleasant climate in class also reported high self-efficacy. Table 7 summarizes the Pearson correlations between the three research variables in a matrix.

Table 7
The Pearson Correlations between the Three Research Variables in a Matrix

Variable	Teaching dimensions	Self-efficacy	Social-academic climate
Teaching dimensions	1	.549**	.608**
Self-efficacy		1	.502**
Social-academic climate			1

* $p < .5$. ** $p < .01$.

Discussion

The transition from face-to-face learning to online lessons was made almost instantly, with little preparation by academic institutions, and creates a strong need for research on the variables that affect and are affected by e-teaching. The study examined whether Hativa's

(2015) paradigm of teaching dimensions predicted students' self-efficacy and perceptions of social-academic classroom climate, in e-Learning situations. Students in several academic institutions were sampled, asked to choose one course they had studied online and completed a questionnaire on their learning experience, rated various teaching dimensions of their lecturer, the classroom climate, and their own self-efficacy in the selected course.

Supporting H1 and H2, the cognitive and affective dimensions of teaching dimensions were found to predict perceived social-academic learning climate and self-efficacy, such that the lecturer's ratings on teaching dimensions were positively associated with the students' reported self-efficacy and learning climate. Students often receive information that confirms their beliefs and convinces them that they are capable of performing a task. This is because it is easier to form a sense of self-efficacy in difficult circumstances if people in one's close environment express their confidence regarding the individual's ability. Such social persuasion is particularly effective when the information sender is considered knowledgeable and trustworthy. This may lead to an explanation of the findings concerning the second hypothesis, since a lecturer who is perceived to be knowledgeable and trustworthy has a greater probability of contributing to students' self-efficacy. Another possible explanation of the findings can be found in the study conducted by Pratt (2002), who claimed that a learner-centered style of teaching, which emphasizes support, positive feedback, encouragement, empathy, and respect for the student, might shape and reflect the classroom climate and influence students' self-efficacy and achievements. As a result, certain aspects of the lecturer's teaching style might influence both perceived social climate and self-efficacy.

In support of H4, the findings indicated that the affective dimension of teaching, which includes respect, empathy, and support to students, is the strongest predictor of self-efficacy. On this aspect of the teacher-student relations Pratt (2002) stated that one of the main goals of the learner-centered educator is to establish positive teacher-student relations that nurture students' self-confidence and self-efficacy. A study by Hilgemann and Blodget (1991) found that the exemplary lecturer is one who expresses a positive and respectful attitude towards his students, and another study by (Lumpkin, 2007; Wentzel, 1997) found that exemplary lecturers are those who give students individual attention, involve them in the learning process, encourage them, and create a positive class atmosphere. Studies (e.g., Lumpkin, 2007; Wentzel, 1997) also found that students who perceived their teacher as caring and supportive were inclined to be more strongly motivated, which was reflected in effort and persistence, which increased the probability of students' success in their studies. A lecturer's respect, empathy, and support, all affective dimensions of teaching, predict students' motivation for success among students, increases the probability of success, which may, in turn, predict increased self-efficacy. However, this set of associations was not examined in the current study, and further research should examine this investigative direction.

Hativa (1984) found that, from the students' perspective, the most important attribute of a lecturer is his or her ability to maintain clarity (i.e., give clear and organized lectures). H3, which predicted that, of all categories in the cognitive teaching dimension, teaching clarity will be the strongest predictor of self-efficacy. In the current study, the category of class organization was not found to make a unique contribution to predicting self-efficacy, in contrast to Hativa's (1991) findings. In online classes, class organization may have less significance, as the lecturer uploads the study material to the internet, facilitating independent learning based on multiple views and readings, even if the class was given in a disorganized manner. Future studies should further explore Hativa's model should be adjusted with respect to class organization in the case of e-Learning.

Conclusions and Implications

The current study examined the validity of Hativa's (2015) teaching dimensions model during COVID-19, when most academic classes are taught online. For this purpose, 147 students from different academic institutions were sampled and asked to choose one course they had studied online, completing a questionnaire on their experience of the course. After completing demographic information, participants reported their self-efficacy in the course and assessed several teaching behaviors, based on Hativa's model. (2015) theory and rated the social-academic climate during the course.

All the research hypotheses were confirmed. Highly rated lecturers were lecturers who, first and foremost, give clear and comprehensible lessons, respect students, express empathy, and give them support. These are the two most significant categories in Hativa's model. Consequently, our findings support the extension of Hativa's model to the field of e-teaching. Furthermore, Hativa's teaching dimensions were found to predict self-efficacy and positive classroom climate. Therefore, Hativa's model may be used to facilitate students' improvement both by positively influencing the classroom climate and by improving the student's self-efficacy perceptions.

Findings supported the prediction of a positive correlation between classroom climate and self-efficacy, although the correlations found in this study were moderate. The current study is a correlational study and is therefore unable to detect causality or its direction. Future studies might construct an experimental research design to determine the direction of effects, whether self-efficacy affects classroom climate or the reverse. Further research may conduct a more intensive examination of the association between self-efficacy and classroom climate and examine potential moderators and mediators of the association between these two variables.

Findings also indicate correlations between the research variables and several demographic variables: Students' ratings of lectures were significantly positively correlated with students' age and years of schooling, and significantly negatively correlated with male gender. Self-efficacy was also significantly positively correlated with age and years of schooling. Classroom climate significantly negatively correlated with male gender and significantly positively correlated with age. No possible explanations were found for these findings in the literature reviewed, and since the current study is a correlational study there is a need for further studies to examine the meaning of these associations. Future studies might construct a different research setup that uses other operationalizations and statistical methods. Furthermore, the correlation found between age and the three research variables may be attributed to students' increased experience, which may have affected students' self-efficacy based on past successes; Experienced students may have studied with a large number of teachers and lecturers, are familiar with a range of teaching methods, and thus are more inclined to identify and appreciate positive qualities of lecturers and the advantages of specific teaching methods. In light of the finding that self-efficacy and teaching style are correlated with classroom climate, future research may explore whether students' age is also correlated with perceived classroom climate.

Declaration of Interest

Authors declare no competing interest.

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‘DIGITAL’ OVERVIEW AT THE PROFILES OF PRE-SERVICE TEACHERS: DIGITAL AWARENESS, COMPETENCE AND FLUENCY

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Abstract

The adaptation of the teachers to the digital age, the integration of their digital skills into the learning and teaching processes, their digital awareness, competencies and fluency constitute an important problem which is within the scope of lifelong learning.The aim of the present study is to examine the digital profiles of pre-service teachers within the framework of universal education principles and online learning theories during the pandemic period. To serve for this purpose, 'digital' profiles of pre-service teachers, who prepare individuals for the digital society, are going to be investigated. Furthermore, their digital awareness, competence and fluency levels are going to be highlighted, and the concepts are going to be discussed in the light of current developments that are under the effects of the pandemic. Thus, the level of relationship between the concepts are going to be underlined to offer solutions to current digital problems. As for the procedure, the study used relational screening model on 539 pre-service teachers. According to the results, digital awareness, competence and fluency levels of pre-service teachers were high. There is a positive, moderate and significant relationship between digital awareness and digital fluency; similarly, there is a positive, high level and significant relationship between digital fluency and digital competence. At this point, digital awareness and competence explained 62% of the variation in digital fluency. Via the present study, it is possible to note down that the concepts of digital awareness, digital competence and digital fluency might be explained thoroughly. Hence, the present study is expected to contribute to the literature and all stakeholders related to education.

Keywords: *digital awareness, digital education, digital competence, digital fluency, the relational survey model*

Introduction

Technological advances in the digital world appear as a phenomenon that transforms and improves human life; hence, every innovation that emerges in this field is revolutionary. Particularly with the development and spread of portable mobile technologies, a 'digital' process has started for all objects, people and institutions, in which innovations, such as education, develop rapidly, and this digitalization process is still going on.

In digital environments, Internet and digital tools are widely used by people due to activities aimed at meeting personal needs such as shopping, banking, social sharing, online and offline games. While performing these digital transactions, it is important that individuals need to be aware of their responsibilities, and they need to be directed correctly. Digital awareness is generally used to mean working with digital tools and contexts in research, communication, entertainment. Awareness in digital environments plays an important role in ensuring effective digital communication because participants must be aware of the behaviour and responsibilities of the people they interact with.

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Considering the studies on this subject, it is seen that individuals are exposed to the negative effects of digital technologies. To exemplify its negative effects: excessive use of technology, cyberbullying, internet or game addiction, exposure to pornography, meeting strangers online, etc. ,such risky online behaviors, can be added to the list (Cernikova et al., 2015). There are also studies that reveal some physical problems associated with technology use, including headaches and stomachaches, eye problems, and poor eating habits (Do et al., 2013). In addition, studies describing the negative health effects of technology use such as sleep problems, internet addiction, mental fatigue and aggression, have been found (Cernikova et al., 2015). It was emphasized that individuals, who do not pay attention to the reliability of the content, experience widespread passivity and cannot critically interpret digital content, emphasizing the importance of individuals using digital technologies safely (Bennett et al., 2008). Studies show that it is important for individuals to be aware of all these negativities caused by digital tools and uses so that they can have a healthy digital experience. It is important for teachers who will raise the individuals of the future to act with this awareness and to use digital tools correctly and beneficially in a way to increase the awareness of individuals in the learning-teaching process.

Digital competence began to be discussed in 2006 by the European Parliament, and the Council (European Council, EC) accepted it as one of the basic competences for 'lifelong learning', and by the European Union (European Union, EU) "Information society technology in business includes reliable and critical use of it for entertainment, learning, and communication." (Vieru, 2015). Digital competence generally refers to the skills and literacy that an average citizen needs to learn in the digital information society. Individuals, who are digitally proficient, can think creatively and critically. Moreover, they may constantly improve themselves digitally, have a technological consciousness and a technical understanding (Ferrari, 2013). This concept has become a key concept in both the national and international community in discussions about the kinds of skills and understanding students need in the digital society (Pettersson, 2018). Kelentrić et al., (2017) also created a theoretical 'digital competence framework' for teachers with their work. Sub-dimensions of the professional digital competence framework for teachers are as follows: (1) Subjects and basic skills, (2) Interaction and communication, (3) Pedagogy and content production, (4) Leadership of learning processes, (5) Change and development, (6) Social school and ethics. In order for individuals to be actively involved in digital societies, teachers need to be equipped with digital competencies both personally and professionally along with their instructional and pedagogical skills. In this context, it is vital for pre-service teachers to develop their digital competencies and reveal the educational potential of digital technologies.

It has been highlighted in the previous studies that modern digitalization has created an increasingly complex school environment (Hatlevik & Christophersen, 2013). Therefore, there is a need for teachers who can adapt the latest digital trends in education to their lessons and apply them competently. Just like other professions, since teachers have gained more access to digital tools, media and resources in recent years, students and teachers have begun to use various digital resources and social media networks in their teaching processes, which has affected how and how they interact with learning (Burden et al., 2016).

Thanks to the use of digital tools (computers, smart boards, mobile devices, internet, etc.) used in education in the classroom environment, the role of the teacher in the classroom has changed. Therefore it has become important to correctly guide students, who can access information anytime and anywhere, via technology. For this reason, the digital process experienced has also created some new problems in terms of teachers' methods in the context of pedagogical and classroom management, digital resource creation/development, content knowledge and development of basic skills (Kelentrić et al., 2017). In that sense, teachers should restructure their traditional approaches to education through digital technologies and create strategies that can improve themselves in a 'digital' sense in order to survive this integration process in a good way.

Teachers should be able to successfully integrate digital technology into their teaching processes while educating individuals of the digital world. In the digital age of teachers, individuals need to obtain awareness, self-confidence, knowledge, skills, competence, ethical frameworks for the functionality of education. They also need to integrate these skills to facilitate individuals' adaptation to the future by integrating them with their own learning-teaching processes.

While dealing with the problems related to the digital adaptation of individuals to the digital age of the educational environments, the 'Coronavirus/Covid-19' pandemic, which emerged in 2019 and was effective all over the world in 2020, added new problems to individuals. It has brought comprehensive digital changes to all areas of our lives, education, in particular. Social distance and restrictive movement policies have significantly disrupted traditional education practices, and the digital education process has started quickly.

Throughout this process, the digital infrastructure of schools and the digital skills of teachers, serving the purpose of education, appear as an important indicator in terms of students' success (Yudiawan et al., 2021). The rapid and change in the way of teaching and learning due to the pandemic has prompted educators to seek skills and ways to effectively engage educators and students in the learning process. Against this background, it is crucial to highlight the need for the digital skills of solid and proven trainers. In the present study, it is considered that investigating the digital awareness, competencies, skills and fluency levels of pre-service teachers might make vital contributions to education, society and the education policies. It is significant to examine the concepts such as "awareness, competence and fluency within the scope of lifelong learning skills" in that they also constitute the basic dynamics of education of future teachers in a digital sense. In order to ensure an effective digital interaction, the individual must be aware of the attitude, behaviour and action displayed in digital environments and take responsibility for them. Individuals with digital competence are also expected to be conscious citizens in the digital world since they interact effectively and productively in the digital environment. The individual's ability to gain new knowledge and skills and to adapt to changes and transformations in technology throughout his/her life depends on their flexible thinking/behaviour and being fluent. It is accepted that it is important for all stakeholders of education to realize this digital integration in a correct, rational and functional way in terms of building the future digital society in a modern and healthy way. In this study, the research questions, to which answers were sought, are as follows: (1) What is the digital awareness, competence and fluency of pre-service teachers? (2) Is there a significant relationship among levels of digital awareness, digital competence and digital fluency of pre-service teachers? (3) Do digital awareness and competence of pre-service teachers predict their digital fluency?

There have been various studies conducted on this topic to find out answers. Cernikova (2018) examined the experiences of students aged 9-16 and their awareness of digital media use, and Yılmaz (2016) examined teachers' awareness of digital data security. In another study, Çebi and Reisoğlu (2020) examined pre-service teachers' views on their digital competence, and Pettersson (2018) examined the pedagogical aspects of digital competence in international research between 2007 and 2017. On the other hand, Guillén-Gámez (2018) examined the actual use of digital competence in education, and Svensson and Baelo (2015) examined pre-service teachers' digital competences. In the other related studies, Fulgence (2020) examined how teacher educators can improve digital fluency, Demir (2018) examined digital fluency of pre-service teachers, and Chigona (2018) examined teachers' digital fluency. When the literature is examined, it is seen that the concepts of digital awareness, competence and fluency are investigated as a single variable. In this study, it is aimed to examine the digital profiles of pre-service teachers within the framework of universal education principles and online learning theories during the pandemic period.

The aim of the present research was to conduct research on the 'digital' profiles of pre-service teachers, who prepare individuals for the digital society, to find out their digital awareness, competence and fluency levels and to discuss the concepts in the light of current developments with the effect of the pandemic. It is expected that the levels of relations between the concepts are going to be revealed to solve current digital problems.

Research Methodology

Model

Studies conducted to examine the existence or degree of the relationship between the variables are evaluated in relational type. The relational survey model is a research approach that aims to detect the presence and/or level of variation between two or more variables (Karasar, 2012). In this study, the relationships between digital awareness, competence and fluency levels of pre-service teachers were examined.

Population and Sampling

The present research was conducted on 539 pre-service teachers studying at education faculties of 7 different geographical regions of Turkey in the 2020-2021 academic year. Easily accessible sampling method was used in sample selection. All prospective teachers studying at the faculty of education in Turkey constitute the population of the study. Universities from 7 different geographical regions of Turkey were identified via convenience sampling, and pre-service teachers were selected by simple random sampling technique. During the data collection process, ethical committee permissions were obtained from the institutions and consent was obtained from the participants. The demographic characteristics of the study group participating in the research are shown in Table 1:

Table 1
Demografic Variables of Study Groups

Variables		*N*	%
Gender	Female	432	80.1
	Male	107	19.9
Department	Preschool	71	13.2
	Turkish	60	11.1
	Primary School	59	10.9
	Psychological Counseling and Guidance	55	10.2
	Social Sciences	21	3.9
	Primary School Mathematics	20	3.7
	English	103	19.1
	Science	96	17.8
	Others	54	10.0
Grade level	1st grade	161	29.9
	2nd grade	115	21.3
	3rd grade	149	27.6
	4th grade	114	21.2
Geographical region of study	Mediterrenian	171	31.7
	Marmara	136	25.2
	Aegean	59	10.9
	Central Anatolia	92	17.1
	Black Sea	38	7.1
	Eastern Anatolia	29	5.4
	Southeastern Anatolia	14	2.6

Data Collection

In the course of 2020-2021 academic year, the participants in the research group were contacted during the collection of quantitative data, and they were informed about the purpose of the research and the volunteering principle through the 'Google Form'. The application forms including the personal information form and measurement tools prepared by the researcher were applied to a total of 539 pre-service teachers via the online platform. Information about the data collection tools to be used within the scope of the research is given below.

Personal Information Form

In the "Personal Information Form" prepared by the researcher, information such as "gender, department of education, class level, geographical region of education" was included in line with the opinions of 4 field experts (2 Turkish Education and 2 Curriculum and Instruction).

Digital Awareness Perception Scale

The Digital Awareness Perception Scale, developed by the researcher for this study, consists of 5 factors and 20 items. The scale includes 5 items in the 'risks of using digital tools' factor, 5 items in the 'positive effects' factor, 4 items in the 'adverse effects' factor, 3 items in the 'ethical-legal' factor and 3 items in the 'social-communication' factor. The internal consistency coefficients of the sub-factors of the original scale were found to be .68 for risks of digital tool use, .70 for positive effects, .72 for negative effects, .71 for ethical-legal dimension and .71 for social-communication dimension. In this study, the internal consistency coefficients of the sub-factors of the scale were found as: .89, .89, .90, .90 and .90, respectively, and a value of .88 for the whole scale was detected.

Digital Competence Perception Scale Of The Pre-Service Teachers

The Pre-Service Digital Efficiency Perception Scale, developed by the researcher for this study, consists of 26 3-dimensional items. There are 8 items in the 'media-communication competencies' factor of the scale, 8 items in the 'design competencies in digital environments' factor and 10 items in the 'information competencies' factor. The internal consistency coefficients of the sub-factors of the scale were found to be .90 for media-communication competencies, .90 for designing instruction in digital environments, and .88 for informatics competencies. In this study, the internal consistency coefficients of the sub-factors of the scale were found as .89, .88 and .88, respectively, and a value of .88 for the whole scale was revealed.

Digital Fluency Scale

The Digital Fluency Scale (DAS), developed by Demir (2018), is a five-point Likert-type instrument with 3 sub-factors and 29 items. There are 14 items in the "Awareness" factor, 11 items in the "Self-efficacy" factor, and 4 items in the "Affective" factor of the scale. The internal consistency coefficients of the sub-factors of the scale were found to be .92 for awareness, .91 for self-efficacy and .80 for affective. The internal consistency coefficients of the sub-factors of the scale used in this study were found to be: .87, .88 and .90, respectively, with the necessary permissions obtained, and the value of .88 for the whole scale was reached.

Data Analysis

So as to analyse the gathered data, the correlation coefficient was used while examining the relationships among digital awareness, competence and fluency levels of pre-service teachers. Correlation is a statistical technique that gives the degree of relationship among multiple variables. The Pearson Product-Moment Correlation Coefficient is used to find the relationship between two continuous variables. SPSS 20 package program was used to calculate the Pearson Correlation Coefficient between the variables. For multiple regression testing, Pearson Correlation Coefficient was also used. In the research, multiple regression analysis, which was conducted to show the predictive power of digital awareness and digital competence variables on digital fluency, is an analysis method for two independent variables to predict a dependent variable.

Furthermore, there is no missing data in the study as the data were collected through the online data collection method. According to the Kolmogorov-Smirnov test result for the normality assumption ($p>.05$), the gathered data are normally distributed (Terzi, 2019). The assumptions of multiple regression analysis were tested before the analysis of the data. When the outliers are examined, the Z values used in the detection of univariate outliers should be between +3 and -3 (Tabachnick & Fidell, 2013), and no univariate outliers were found in the study. According to Cook's values, since there is no value above 1, there is no outlier in this respect. When Mahalanobis distances were examined, 66 data were found to have multiple outliers and were excluded from the analysis. As a consequence of the assumption tests analyses were made with 473 data.

Research Results

Results About Digital Awareness Levels of Pre-Service Teachers

The digital awareness levels and sub-dimensions of pre-service teachers are represented in Table 2.

Table 2
Digital Awareness Levels and Sub-Dimensions of Pre-Service Teachers

Items	*N*	$\bar{X}$	*SD*	Range
Risk	473	4.33	2.83	Extremely high
Positive Effects	473	3.59	4.63	High
Negative Effects	473	4.06	2.70	Extremely high
Ethical/Legal	473	4.27	1.91	Extremely high
Social/Communication	473	4.08	1.83	Extremely high
Total Awareness	473	4.05	9.05	Extremely high

In line with the data in Table 2, it can be said that the digital awareness levels of candidate teachers are extremely high for risk, negative effects, ethical/legal, social dimensions and the scale as a whole; on the other hand, it was observed that it is at a high level in the positive effects sub-dimension.

Results About Digital Competence Levels of Pre-Service Teachers

The results of digital competence levels of pre-service teachers and sub-dimensions are illustrated in Table 3.

Table 3
Digital Competence Levels and Sub-Dimensions of Teacher Canditates

Items	*N*	$\bar{X}$	*SD*	Range
Media-Communication	473	4.23	5.15	Extremely high
Designing Teaching	473	3.92	6.73	High
Information Technologies	473	3.94	6.45	High
Total Competence	473	4.02	15.77	Extremely high

Considering the figures in Table 3, it can be said that digital competencies of pre-service teachers are at a 'high' level in the instructional design and informatics sub-dimensions. The competencies are at a 'quite high' level for the media-communication sub-dimension and the whole scale.

Results About Digital Fluency Levels of Pre-Service Teachers

The digital fluency levels and sub-dimensions of pre-service teachers are presented in Table 4.

Table 4
Digital Fluency Levels and Sub-Dimensions of Pre-Service Teachers

Items	*N*	$\bar{X}$	*SD*	Range
Awareness	473	3.59	10.03	High
Self-efficacy	473	4.03	6.41	Extremely high
Affective	473	3.04	3.44	Medium
Total Fluency	473	3.68	16.75	High

Taking the numbers in Table 4 into consideration, it is possible to claim that the digital fluency of the pre-service teachers is high for awareness and the whole scale, quite high for self-efficacy and moderate for the affective sub-dimension.

Results About The Relationship Among Levels Of Digital Awareness, Digital Fluency And Digital Competence For Pre-Service Teachers

The relationship among digital awareness, digital fluency, and digital competence levels of pre-service teachers was examined with Pearson Product Moments Correlation, and the results are shown in Table 5 below.

Table 5
Pearson Product Moments Correlation Table

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1													
2	.260**	1												
3	.150**	.091*	1											
4	.386**	.340**	.303**	1										
5	.443**	.327**	.062	.372**	1									
6	.662**	.758**	.469**	.672**	.606**	1								
7	.450**	.389**	.042	.405**	.376**	.514**	1							
8	.492**	.428**	.077	.451**	.506**	.594**	.869**	1						
9	.121**	.019	-255**	-.001	.091*	-.010	.121**	.157**	1					
10	.483**	.401**	.002	.415	.438**	.533**	.956**	.935**	.338**	1				
11	.396**	.233**	.065	.272**	.579**	.437**	.463**	.572**	.061	.509**	1			
12	.305**	.498**	.231**	.447**	.300**	.574**	.652**	.653**	.031	.647**	.482**	1		
13	.476**	.385**	.082	.437**	.493**	.563**	.820**	.844**	.121**	.839**	.588**	.721**	1	
14	.455**	.446**	.153**	.458**	.519**	.618**	.765**	.811**	.083	.786**	.773**	.879**	.909**	1

(Variables: 1. Risk, 2. Positive effects, 3. Negative Effects, 4. Ethical /Legal, 5. Social/ Communication, 6. Total Digital Awareness, 7. Awareness, 8. Self-efficacy, 9. Affective, 10. Total Digital Fluency, 11. Media- Communication, 12. Designing Education, 13. Information Technologies, 14. Total Digital competence)

When the correlations between digital awareness, fluency and competence levels of pre-service teachers were examined, it was observed that there was a positive, moderate and significant relationship between digital awareness and digital fluency (r = .533, $p < .05$), compared to the general scales. In other words, there is a positive, moderate and significant relationship (r = .618, $p < .05$), and there is a positive, high and significant relationship between digital fluency and digital competence (r = .786, $p < .05$). Considering the correlations according to the sub-dimensions, it can be said that the highest correlation is between the self-efficacy dimension of fluency and the informatics dimension of competence (r = .844), and the lowest correlation is between the ethical/legal dimension of digital awareness and the affective dimension of digital fluency (r = -.001).

Results about the Predictions of Digital Awareness and Digital Competence Levels of Pre-service Teachers to Their Digital Fluency Levels

Multiple regression analysis was conducted to reveal whether the digital awareness and competences of teacher's candidates predict their digital fluency levels or not, and the results are presented in Table 6.

Table 6

Multiple Regression Analysis Results about the Predictions of Digital Awareness and Digital Competence Total Scores of Pre-Service Teachers on their Digital Fluency Levels

Vairables	*B*	*SE*	*B*	*T*	*p*	*Binary r*	*Partial R*
Invariant	13.278	4.327	-	3.069	.002	-	-
Total Awarenesss	0.142	0.067	0.077	2.123	.034	0.533	0.091
Total Competence	0.784	0.038	0.738	20.432	.000	0.786	0.686
R = 0.788	R^2 = 0.621						
F = 385.013	$p < .001$						

Digital awareness and digital competence that are thought to be effective on digital fluency of teacher's candidates, and they showed a significant relationship with digital fluency ($R = 0.788$; $R^2 = 0.621$) (F (2-470) = 385.012, $p < .01$. These two variables together explain 62% of the variation in digital fluency. According to the standardized regression coefficient (β), the relative importance of the predictor variables on digital fluency is for total competence ($\beta = 0.738$) and for total awareness ($\beta = 0.077$), respectively. Taking the results regarding the significance of the regression coefficients into account, it is possible to claim that digital awareness and digital competence are significant predictors of digital fluency ($p < .01$). Furthermore, when the relationships between predictive variables and digital fluency are examined, a correlation is observed at the level of digital awareness ($r = .533$) and digital competence ($r = .786$). Finally, when the effects of other predictor variables are controlled, the relationships are found. To highlight, correlation is observed at the level of digital awareness ($r = .091$) and digital competence ($r = .686$).

Discussion

In line with the findings, it has been revealed that digital awareness of pre-service teachers are high. Aksoğan and Özek (2020) found out that pre-service teachers had high levels of technological awareness and competences; similarly, Yılmaz et al., (2016) has also highlighted that teachers' digital data security awareness was highly high in their work. When the studies carried out up to now are taken into account, it is seen that similar results have been obtained with this study. Education faculties might improve the awareness of the participants not only in the security, legal or health issues but also in all areas. To make them have many perspectives, they can affect the awareness of individuals via social events. It can be said that if pre-service teachers' digital awareness is high, they can adapt to the digitalized world more easily and integrate digital technologies into the learning-teaching process more functionally.

Furthermore, it has been emphasized in the present research that the digital competences of pre-service teachers are at high levels. Aydoğmuş and Karadağ (2020), Heerwegh et al., (2016) have also reported that the digital competence levels of pre-service teachers are at high levels. On the other hand, there are also studies which indicate different findings in the literature. Aksoğan and Özek (2020) indicated in the results that pre-service teachers did not feel competent enough to use technology for education. A study in a similar vein, Menzi et al., (2012) stated that they are not enough to use in technology yet, and they are not sufficient in advanced and technical areas such as databases, social, legal and ethical issues. With high digital competencies, it can enable them to solve problems that may occur in digital environments (Roll & Ifenthaler, 2021).

This situation might be explained by constant updates of legal and ethical issues due to the nature of digital technologies. This nature leads to changes in line with the emergence of new situations or conditions. In addition, elements such as the socio-economic level of the region where the research is made, access and usage levels of digital technologies could also affect. In this context, individual activities should be provided for relatively insufficient pre-service teachers in the learning process so as to increase their technological interest and requests.

It has been observed that the digital fluency of pre-service teachers is also at a high level. Demir (2018) found out in his study that pre-service teachers' digital fluency was moderate. Chigona (2018), in his study with teachers, reported that the digital fluency of the participants was insufficient, and they could not benefit from digital connections in the learning-teaching process; thus, they obtained a different result from the study. On the other hand, Pinho and Lima (2013) stated in his study with teachers that digital fluency is a motivational factor, a necessary competence in a remarkable and active learning process, and it is important to provide institutional support to teachers in becoming digital fluent. The digital fluency of pre-service teachers can be handled within the scope of lifelong learning, and this skill can be associated with life in their professional and social lives. In such a context, their digital adaptation can be achieved in a life-long and more functional way. It can be said that teacher candidates' digital fluency is high, they can follow current developments in digital technologies, they can be flexible with students in the classroom environment and organize activities creatively.

When the studies in the literature is examined (Ferrari, 2013; Spencer, 2015), it is seen that there are no clear definitions that can reveal the differences between the concepts of 'digital awareness, digital competence and digital fluency', and the features that meet these concepts are sometimes used interchangeably. Hence, if it is necessary to make a complex definition in the light of the literature on these concepts, digital awareness might be defined as the ability to sense, know and perceive the events surrounding the individual about digital technologies and tools, and to be conscious of digitalization, while digital competence might be defined as 'the knowledge necessary to use digital tools effectively; skills and attitudes.' Another concept, digital fluency, can be defined as 'the ability of an individual to adapt to digital technologies and realize learning and experiences in digital environments within the scope of lifelong learning'.

Taking the national and international literature into consideration, no study has been found that deals with the relationship between 'digital awareness, digital competence and digital fluency'. However, considering the definitions and explanations for these three concepts in the literature (Sparrow, 2018; Spencer, 2015), it is seen that these concepts are almost intertwined. Briggs and Makice (2012) describes the characteristics of digitally fluent individuals as "(1) being aware of when and how digital tools should be used, (2) being able to use digital tools very effectively and making digital tool use an automated skill and (3) new technologies as digital technologies change and evolve". According to this explanation, it can be said that the first characteristics of digital fluent individuals is digital awareness, the second is digital competence, and the third is digital fluency.

Conclusions and Implications

In the present study, digital awareness, competence and fluency of pre-service teachers are at a 'high' level. This can be explained by the fact that digital technologies/tools are actively used in all areas of life, particularly with the effect of the Covid-19 pandemic process. Furthemore, it is important to note down that pre-service teachers were born in this digital world, and they started to interact with digital tools from an early age. The fact that these skills of teacher candidates are high can help them establish virtual collaborations with digital communication tools in the classroom environment.

Considering the relationships between digital awareness, fluency and competence levels of pre-service teachers, it has been concluded that there is a positive, moderate and significant relationship between digital awareness and fluency and between digital awareness and competence, and it has been revealed that there is a positive, high level and significant relationship between digital fluency and competence. Digital awareness and competence together showed significant associations with digital fluency. At this point, digital awareness and competence explain 62% of the variation in digital fluency. Based on this result, it can be said that digital awareness and competence affect digital fluency, but there may be other variables that affect fluency. Research can be done on what different variables might be.

In this study, the aim was to clearly define and explain the concepts of 'digital awareness, digital competence and digital fluency', to determine the level of relationship between the features of these concepts and concepts, to examine the predictive levels of digital awareness and competences of pre-service teachers for their digital fluency. It is thought that it can contribute to the literature and all stakeholders related to education.

Suggestions to researchers and practitioners may also be as follows: The conceptual relationships between digital awareness, proficiency and fluency can be explored with students studying at different teaching levels. Course contents and learning environments of all departments of Education Faculties can be delivered by integrating with digital technologies. Another examination on this issue could be done with qualitative research patterns (namely phenomenology, case study and action research) in which there could be chances to examine digital competences thoroughly from many perspectives.

This research can be a useful resource for scientists and policy makers working on the digitalization of education, the digital integration of learning environments and the digital competences of educators. Instructors can use the results of this study as a guide. It can create awareness in all stakeholders of education, especially trainers, in order to digitalize learning environments in a functional way and to reveal the digital profiles of trainers.

Note

This study was produced from the doctoral thesis prepared by the first author under the supervision of the second author.

Declaration of Interest

The authors declare no competing interest.

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ISSUES IN SUBJECT COMBINATIONS CHOICE AT ADVANCED LEVEL SECONDARY SCHOOLS IN RWANDA

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Abstract

The present study explored the issues related to subject combinations choice at advanced level secondary schools in Rwanda. Three schools with various subject combinations were conveniently selected from three districts in Rwanda. Two hundred and thirty-eight participants, including 211 students (grade 10 to 12), three director of studies (DOS), and 24 teachers, were selected purposively to participate in this study. A survey questionnaire for students, interviews with DOS, and focus group discussions with teachers were employed to collect qualitative and quantitative data for triangulation purposes. For instance, a questionnaire was used to reveal students' choice of their subject combinations, a DOS interview to learn how combinations are assigned to students, and teacher FGD to learn difficulties students face due to assigned subjects. Quantitative data were analyzed with descriptive statistics, while qualitative data were analyzed using thematic analysis methods. The results analysis revealed that some students studied what they chose, while others were given what to study based on their performance or influenced by their parents' preferences. Therefore, students reported that they struggled to perform successfully at A' level while they used to perform well at the O' level. It was noticed that what some students learn at A' level have a negative effect on their future life. This study recommends that (i) the career development stakeholders should sensitize students about the impact of the wrong choice, (ii) Rwanda Basic Education Board (REB) should train career guides to help students choose their best combinations, and (iii) students' interests should be given preference than their performance.

Keywords: *advanced level secondary, career path, Rwandan schools, students' choice, subject combinations*

Introduction

In 2008, Rwanda got several reforms where the instructional language shifted from French to English in all schools. Basic education shifted from six years (primary level) to nine years (until ordinary level secondary school) of education (MINEDUC, 2008). In 2012, a 12-year basic education (12YBE) was established, where nine9-year basic education (9YBE) remained compulsory education. Students who study many subjects, including science, mathematics, social sciences, and languages, in compulsory education have a good background and are prepared for specialization. After compulsory education, the last three years of secondary education (advanced level) allow students to select fewer subjects. Some either go for science/mathematics or social science/humanities, while others go for languages and literature. However, the choice policy or assignment of these subjects is an interesting research topic. As it is seen from the Rwanda Basic Education Board (REB) curriculum framework (REB, 2015, p. 19),

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apart from other types of schools such as teachers training colleges and TVET schools, upper secondary school subject combinations are in three categories such as science, humanities, and languages with a total of seventeen different subject combinations (see Appendix A).

Other schools specialized in primary teaching have also been reformulated from one option of primary teaching where students had to study all subjects to 4 combinations which are Teaching Mathematics and Science (TSM), Teaching Social Studies (TSS), Teaching Modern Languages (TML), and Early childhood Education (ECE). Nursing is re-newly introduced in secondary school, while accountancy, agronomy, and veterinary were conglomerated in TVET schools like other subjects such as electricity, plumber, electronics, computer, carpentry, construction, music, drama, and so on.

For students to complete their secondary school, they have a set of subjects available for them that they have to choose from which ones to learn (Fullarton & Ainley, 2000). Career choice is a challenging task for students since their choices influence the profession that they will do in their future life. Thus, students find themselves in the dilemma of which subjects to choose since their choices must be in line with their ability to successfully perform the learning subjects (Edwards & Quinter, 2011). It was realized that the unemployment and high unemployment rate recorded after students' graduation from colleges is linked to the wrong choice made by students when they were in their high schools (Pascual, 2014). Similarly, the study that was done in Rwanda (Itangishatse et al., 2021) revealed that high school students were not well monitored to pursue their future careers after graduation even though the main academic qualification for students between 16-19 years old determines the students' future life, secondary schools' advanced level (A-Level). An A-Level is regarded as the main career destination, employment and/or higher education (Rodeiro, 2007).

Furthermore, trying to understand why there is a decline of senior high school students enrolled in science subjects, Lyons and Quinn (2010) collected ideas from teachers who argued that today students are less interested in science subjects, students do not have enough information related to science careers, students choose less demanding subjects, science subjects require tough tasks, and there is a perception that science careers are poorly paid. Ukobizaba et al. (2020) studied teachers' behaviors towards vital interactions that attract students' interest to learn mathematics and career development and found that there was no link between teachers' behaviors and career path; however, they suggested that teachers should train their students in a way they will perform successfully in their careers of interest. Besides, Borchert (2002) suggested that the exploration of career choice should be a positive effort done by high school students themselves. The author added that a truthful, constructed informed, and substantive career choice process would result in the meaningful, productive, satisfying career choices. The explored literature was limited in the study subject and labor market relationship, the reason why this study will inform researchers of the effects of study subject to learner performance and labor market.

The social cognitive career theory (SCCT) guided this study by explaining the mechanisms that influence career paths and academic performance (Nugent et al., 2015). This theory is a relatively new theory that is meant to explain the three interconnected aspects of how basic academic and career interests develop, how educational and career choices are made, and how academic and career success is reached (Lent et al., 2006). Therefore, SCCT is referred to in investigating the students' choice of learning subjects towards a career path orientation. It is believed that career path analysis shows individual self-efficacy and positive outcome expectations linked to an individual's vocational interest (Cunningham et al., 2005).

Based on trends of reformulating subject combinations, the present study intends to explore the issues emanating from these reforms. The researchers were interested to know the difficulties faced by students who study under these combinations, whether they choose them by themselves or are assigned to them, and the effect such assignments may bring to their performance. This study explores the subject combination choice policy ever made in Rwanda. It informs policymakers to rethink the assignment of combination to certain learners and the effects the decision may cause.

Therefore, the specific research questions that guided this study were:

- How do students choose the subject combinations they are studying in?
- What are the students' perceptions of their capacity to learn in their subject combinations?

Research Methodology

General Background

This study used a survey design and a mixed-method (Fraenkel et al., 2012). We surveyed 211 students, interviewed three directors of studies (DOS), and discussed with 24 teachers from three schools. The first school located in Kayonza district has three subject combinations (PCB, HEG, and LKK), the second school located in Rwamagana district has five subject combinations (PCB, MCB, PCM, MEG, and HEG), and the third school located in Rulindo district has three subject combinations (HEG, MEG, and MCE). Schools were selected using convenient sampling technique, depending on the accessibility of each of the authors. For each school, we administered questionnaires to students, interviews to DOS, and focus group discussions to teachers to triangulate data. The interview for DOS–as they involve in school administration–focused on a school's procedure owning a combination, how students are assigned in those combinations, and the assignment effects. A focus group discussion for teachers focused on the relationship between previous combinations and current combinations, matching current combinations, and effects affecting students toward assigned combinations.

Research Sample

These 211 secondary school students involved in the study were from grade 10 to grade 12. Forty-one percent are male, while 59% are female students. These students are from seven different subject combinations, five of science, one of social science, and one of the languages. Science (PCM, PCB, MCB, MCE, and MEG contributed to the sample of 149 (71%) students, Social science (HEG) 54 (26%), and Language (LKK) 21 (10%) (see Table 1).

Table 1
Sample Size (N) of Students

Gender	*N*	%	**Subject Combination**	*N*	%
Male	86	41	PCM	16	8
Female	125	59	PCB	34	16
Total	211	100	MCB	13	6
			MCE	42	20
			MEG	31	15
			HEG	54	26
			LKK	21	10
			Total	211	100

PCM: physics-chemistry-mathematics, PCB: physics-chemistry-biology, MCB: mathematics-chemistry-biology, MCE: mathematics-computer science-economics, MEG: mathematics-economics-geography, HEG: history-economics-geography, and LKK: Literature-Kiswahili-Kinyarwanda

Data Collection

Prior to surveying the respondents, the purpose of the research was introduced. Voluntary participation was compromised with DOS, teachers, and students, and the confidentiality of their information was promised to them. The data were collected in the beginning of 2019. Questionnaire administered to students took 40 minutes; the interview to DOS lasted about 30 minutes, while focus group discussion lasted between 40 and 60 minutes. Students took the survey in their classrooms, the interview was done in the DOS office, while the focus group discussion was done in the staff room (one focus group discussion in each school).

Validation of Instrument

For validation, face validity was used. The questionnaire was handled to one small classroom of grade 11 students from the school near the University of Rwanda College of Education in Kayonza district. The initial questionnaire was composed of nine items. After analyzing data from the pilot, it was decided to rearrange the number of items and add two more items to make more consistency, and triangulate data. The sub-questions of item-5 were not numbered, and the school was before the government. Items 10 and 11 were after item 5, and items 7 and 8 were added. In item 6, "I perform well in these subjects," is replaced by "I based on marks. For reliability and trustworthiness, two researchers have coded the data independently, and most of the categories presented were similar to each of the two researchers.

Data Analysis

Descriptive statistics (Fraenkel et al., 2012) was used to analyze quantitative data and content analysis (Krippendorff, 1989) to analyze qualitative data. For instance, percentages were used to presenting students who chose the schools and combinations by themselves and those who were assigned to them. Themes were categorized based on students' written opinions (for example, why they think is the reason to choose or be assigned in a certain combination), perceptions of DOS, and teachers on students' performance based on their combinations. These threads came up from data and were decided based on research questions.

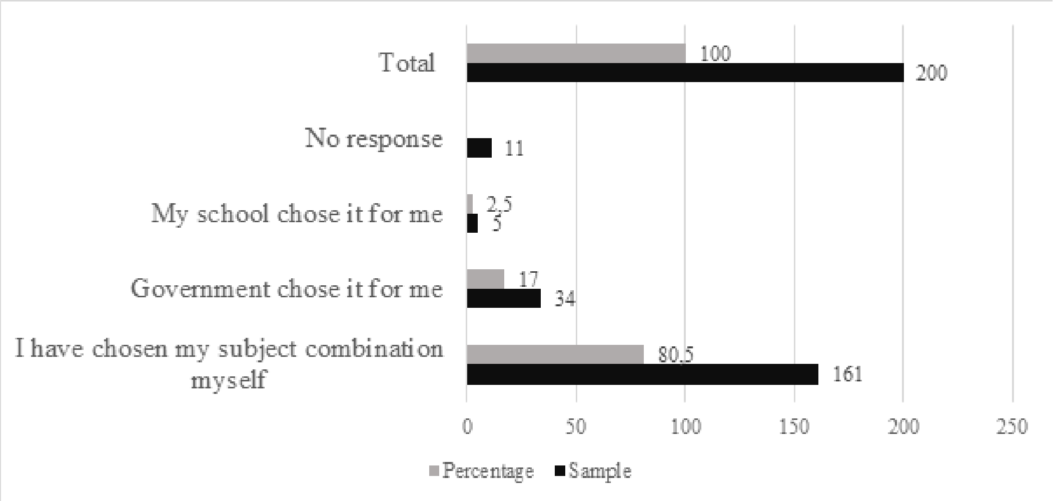
Research Findings

The Way and the Reason why Subject Combinations are Assigned

Since we collected data at the beginning of 2019, students sampled completed their ordinary level in 2016 (those who were in grade 12), 2017 (those who were in grade 11), and 2018 (those who were in grade 10). We asked the students if they were studying at the school, they had chosen themselves, and most of them replied, "no." Forty-three percent of students said they had chosen the school they are in themselves during school selection according to the subject combinations which were there, after the ordinary level (grade 9), while 57% said the schools they are studying in were different from what they have chosen.

When it comes to choosing a subject combination, we found that 80.5% have selected the combination themselves. However, 19.5% did not have a chance to select the combination they pursued. Some of them were assigned in the combinations by the government, while others were assigned by the school (see Figure 1).

Figure 1
Subject Combination Selection



Students were asked why they chose such combinations and their perceptions about why they were given them.

The reasons why students selected a subject combination range from interest to parental dedication. The most revealed reason students prefer to study a certain subject is an interest. About 97.2% of students select subject combination because they like it, 86.7% have a good performance in those subjects, 76.6% for the job, 53.3% because the subjects are easy for them, and 39.7 because of their parents' wishes (see Table 2).

Table 2
Reason behind Why Students Chose a Subject Combination

	I chose my combination because	Strongly agree	Agree	Disagree	Strongly disagree	Total	% of students
1	I perform well in these subjects	57	60	16	2	135	86.7
2	I like it	102	38	3	1	144	97.2
3	My parents advised me to choose it	11	41	41	38	131	39.7
4	When you study this, you get job	48	54	25	6	133	76.7
5	The subjects are not difficult	26	39	40	17	122	53.3

Note: The % of students is calculated based on the number of students who agree and strongly agree. Note: the total number of students reflects those who responded to the question

The students who were given the combinations as they requested were not different from why they selected such combinations. The reasons range from the performance to the interest. Students think the cause to be given the chosen combination was the score they got in the national examination at the end of grade 9, their interest, and career outlook.

Some students were sure of the reason for the given combination, while others were guessing. Students who were confident of the reason said: "Yes, they gave me what I selected because my performance was better in History, Geography, and other related subjects." "Ordinary level performance showed that I can complete PCM at Advanced level. They gave me PCM because I performed well mathematics, physics, and chemistry at an ordinary level." The cause to be given the chosen combination is that “the grades in the National exam I scored marks in Geography and Mathematics better than other subjects." Counter wise, students who were not sure of the reason said: "Maybe because I chose it, or even I got enough marks." "They gave me the combination I chose maybe because of the marks I got during my examination of Senior 3; I think also it was because of the performance of all candidates who were needed in that combination." "Because it is authentically useful in my life, I guess it is because of marks." "It was due to the availability of combinations."

Most of the students have a reason why they should engage in a certain subject combination. For instance, those in science are inspired to become medical doctors, those in social sciences to become business entrepreneurs, and those in languages to become language interpreters. Students from science subject combinations wished to undertake science because of jobs and careers such as medical and aviation. "During the national examination (2016), I performed mathematics, chemistry, and biology, and I wish to become a doctor in medicine to take care of patients." "I performed well in all the courses; I selected mathematics, physics, and chemistry as a way of expressing my wish to be a pilot." "My combination will play a big role in becoming a stewardess. I want to know more about the aviation industry."

Students from science and social science combinations believe in their combination as a source of jobs and carrier in business management, politics, lawyer, and leadership. "I prefer to continue in this combination with respecting the future job vacancies, and I did this as to plan and to put my dreams into the reality of future business manager, I want to become a big businessman and have own business." "I have chosen this combination (MEG) because I used to like history and geography when I was in the ordinary level, and I actually have a dream to become an Economist." "I decided to study MEG because in my future I want to be a business girl, and MEG helps you to know how resources are used in the economy." "I was given HEG because they have seen abilities in me. I think I prefer to continue my study in law, political science, etc., which inspired me to choose this combination. I would like in future to become a leader or lawyer."

Students from language combinations believed in their combination as a source of jobs and carrier in language fluency and translation. "I like the LKK combination; it will help me speak the language very well." "The combination of literature, Kinyarwanda, and Kiswahili helps to know the languages; it will help me advance my career as I wish to be an interpreter." Some students believe in their subjects as destiny, such as the key to advancing their studies to university, future dreams, favorites, and enjoyment. "The most cause is to help me in my future for what I want to study in university." "I especially like Geography. I liked it since senior one and because I got good marks in the two studies (Mathematics and Geography), especially Geography, and I was given MEG. These subjects are my favorites." "I am studying this combination due to the marks I got in my national exam, and maybe it was my journey to my destiny." "I based on my grades, my future dreams, my preference, and what I thought was best to satisfy the capacity of my knowledge." "I have chosen this combination because I think that it will help me to fulfill my dreams, which I have to perform in the future, and it is the most understandable for me." "When I was in ordinary level, I saw that these lessons are the ones I know better than others; therefore, I prefer to study them." "I had performed well in those three subjects, and also I really enjoyed them, even I wish I would apply one of these subjects in my career." "I have passed some of its subjects needed to pass the exam, and my teacher who taught me told me that I do have the potential to do it."

Reasons Why Students Are Not Given the Combination they Chose and Effects on their Career

Some students got high scores in national exams, but they were not given what they chose. Table 3 displays perceived reasons and negative effects on their career.

Table 3
Effects of Choosing Combination for Students Depending on High Scores

Assigned combination	Reason	Effect of student career
PCM	I passed well in math as well as I was good at math, physics, and chemistry	My target or dreams will not match if I do not take university studies hence also getting experience as long as it could be my first time to work. It is difficult.
MEG	I scored high marks in the National exam and got good grades in Geography and Mathematics better than other subjects	It will affect my career because I studied what I did not want to learn
MEG	-	I like a combination for LKK. I was thinking to improve my arts and had the target to study journalism in the university

Some students got low scores in national exams, and they were not given what they chose. Table 4 displays perceived reasons and negative effects on their career.

Table 4
Effects of Choosing Combination for Students Due to Low Scores

Assigned combination	Reason	Effect of student career
MEG	-	It affected my career because my target was to be a pilot. I wanted to study MPG, but now I study MEG
MEG	Peer pressure and my parents were the ones that encouraged me to go there, but it was not my choice. At first, I chose WDA[1], and then my parents told me that I would study it later. Also, the school leaders chose it for me after realizing that these subjects were the ones I succeeded highly compared to the other subjects.	I am not strongly capable of succeeding well in these lessons; therefore, I am not proud of my combination. My dreams will not become true on what I was wishing
LKK	-	I don't like these subjects; I think after studying, I will go to study in WDA schools to get a job.
HEG	Influence of parents	I lost my self-confidence
HEG	Because of poverty	I will not be what I want to be

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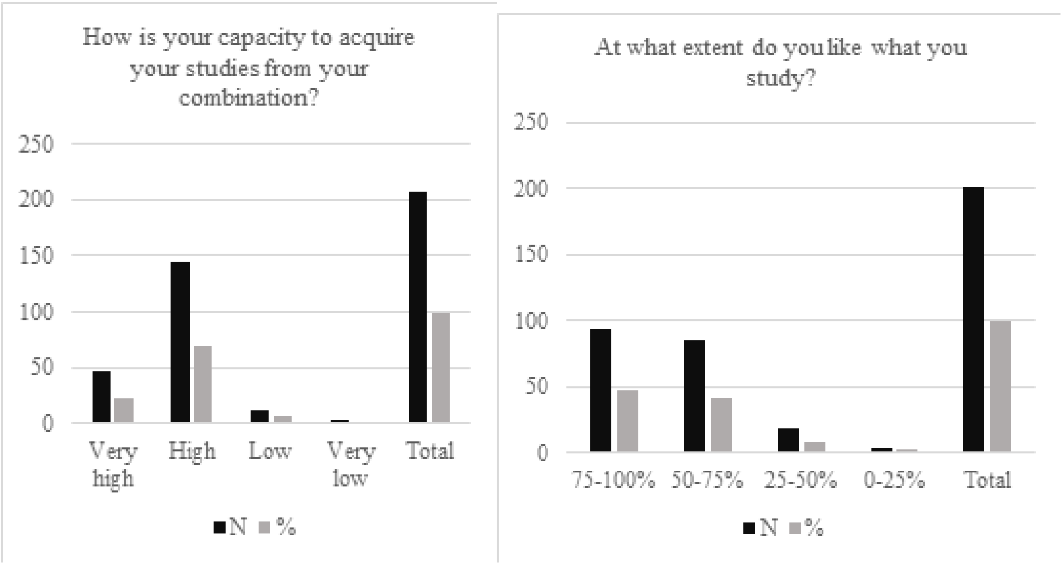
[1] WDA: Work Force Development. WDA is in charge of Technical and Vocational Education and Training (TVET)

MCE	I don't know the reason why they selected MCE for me; maybe they thought it could be the best one	I won't be the one I wanted to be, a journalist, but I will be a DJ[2]
MCE	They thought it could be the best combination for me	I wanted to become a dentist, but I won't be able to fulfill my dream because my career deteriorated, anyway I will be a DJ because I study MCE
MCE	Because the government based on marks I got in the national exam	The performance will be low, and in the future, I will not get a job easily
MCE		Because I didn't choose it, it can cause to have low marks
MCE	I think of the performance	I don't like it, my career will go down and destroy my future
MCE	The government chose the same lesson that I success in high level	I will become a manager instead of my dream of a medical doctor
MCE	The main cause to be given the combination that I didn't choose is because I didn't get enough marks in ordinary level	I will lose because I could perform well other which I had chosen

The research finally studied how students perceived their capacity to acquire studies from their subject combinations and the extent they liked what they study. We have found that 22.6% and 69.7% of students ranked very high and high their capacity to acquire their studies from their combination. Eventually, 46.8% of students ranked the extent they like what they study between 75-100, 42.3% ranked it between 50-75. However, 7.7% of students still rank low and very low their capacity of acquiring their studies from their combination while 10.9 still rank the extent they like what they study below 50% (see Figure 2).

Figure 2
Students Ranking the Outcome from Their Study Subjects



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[2] DJ: Disk Jocker

Processes of Assigning a Subject Combination to Students by Government

In the interview, DOS told us that a school needs to apply from REB to get a combination. Rwanda Basic Education Board (REB) inspects the fulfillment of four requirements before allowing the school to have a certain combination. These requirements are the number of rooms, materials related to the requested combinations, qualified teachers, and the labor market. For instance, if a school needs to open a combination of PCB, it should avail room where the students will study in; put in place physics, chemistry, and biology laboratory; qualified physics, chemistry, and biology teachers; and the needs of studying these subjects in the location of school (for example, no other school has this combination in the area).

Due to how students select combinations, DOS revealed that in Senior 3, students are given lists of schools and hosted combinations to choose. After the national examination, REB assigns students based on performance and the choice of students. However, REB matters on performance than students' interest. This affects much students' learning as they are not motivated. One DOS emphasized the respect of one's interest than his/her performance. "Students who are in their chosen combination, even if they are at low performance, but because of the interest they have in it, they try to perform and succeed."

Some parents also interfere in their children's choices. Parents think of their elder children who work in a certain career; they recommend young children follow it.

Teachers revealed their perceptions about previous and current combinations in group discussions with teachers. In fact, before 2009, students went for two [core] subject combinations, while after 2009, they went for three [core] subject combinations. Students are not happy with their combinations, especially those who were not given the selected combination. "The current combinations make students lose the interest of other minor lessons. Three major subjects are heavy to them and make them dodge minor lessons focusing on examinable subjects."

Due to matching subjects, teachers told us that students perform less because of the low link between subjects such as MEG (Mathematics and Geography or Economics and Geography). "Students are not motivated to study MEG and are not willing to focus on Mathematics. They just want to relax with only Economics and Geography, and this affects their performance." Teachers testified that the link between mathematics and physics and physics and geography make students perform MPG than those in MEG.

Teachers claimed the low level of knowledge due to lack of required infrastructure and specialty regarding effects affecting students toward assigned combinations. "Schools do not afford lab materials, enough books, and other active learning techniques such as field trips to fulfill the needs of their subject combinations; therefore, these facts make students learn little and unable to compete on the labor market."

Discussion

Referring to our research findings, some students did not fully participate in choosing their subject combinations as parents, schools, friends, and REB obliges them their combinations. Some students asked their colleagues to choose combinations for them, while others went with the majority of prestige attached to subject combinations. As the results of our research, we found some students who opted for sciences to please their family, despite being better at arts, and they are really struggling now at A' level, while at O' level they used to perform well. Only learners should be the first ones involved in choosing a subject combination for themselves. For instance, some teachers emphasized that learners should be given enough explanations and time and be guided while choosing a combination.

Comparing the way combinations were settled before and after 2009, it is totally different, and many students and teachers appreciate the way lessons are allocated, but they complain about the way combinations are given. Many students study what they did not choose rather than their preference. Some students said that the government and parents chose combinations for them, and these have a negative impact as they may cause low performance in class. Some students regret what they study due to the way they were given a combination in A' level. And they suggested having a way of changing combinations for students who got a combination they do not want. For instance, some students said that they joined their combinations. After attending a few lessons, they started complaining that certain subjects were difficult to comprehend and asked to change the combination. This means students were misguided either by their peers, teachers, REB, or parents. This was also witnessed by teachers.

The selection that students made on the subjects to learn influences students' chance to access higher education, vocational training, and education or labor market opportunities; Students from the higher social-economic background are likely to take subjects that will allow them to pursue higher learning and the profession, while students from the less socio-economic background tend to take courses that lead them to vocational education and training or often join labor market without any further formal education or training (Fullarton & Ainley, 2000). However, while carrying a study on 200 students about considering the determinants of selecting geography as a discipline: The case of senior secondary school students in Ilorin, Nigeria, Akintade (2011) found that only 48% of students were taking geography because it linked with their future career. At the same time, 35.0 % of students agreed that they chose to take geography because they enjoyed the geography lessons and that teachers' attitudes towards geography attracted their interest in the subject. While developing a model of factors contributing to Science, Technology, Engineering and Mathematics (STEM) learning and career orientation, Nugent et al. (2015) concluded that the value and interest that students have towards STEM subjects influence their self-efficacy and performance in those subjects. The students' interest in STEM subjects also influences youth-expected outcomes towards career orientation. Authors further argued that such interest is influenced by support groups such as educators, peers, and family members.

It is always good to think about the future career and choose the combination wisely. It does not matter whether your whole family studied for one profession or what your friends are saying. It is recommended to choose the subject you love and that you can pass well. Once you are interested in learning subjects, you will always enjoy attending the class, you will likely read deeper, and you will succeed in becoming a professional in your career. Note that the chosen combination today will influence students' future life. The career development stakeholders should sensitize students about the impact of the wrong choice. When a student makes a good choice of a combination, she/he likes, this will motivate the student to pass and understand the content that will result in success, that will improve the quality of education within the Country. REB should train career guiders who should help students in turn to choose their best combinations. Students' interests should be given more weight than students' performance.

Conclusions and Implications

In this study, the issues in subject combinations choice at advanced level secondary schools in Rwanda were studied. The study revealed that some students study what they chose and want to study. Students were given what to study based on their performance. This study focused on how students choose subject combinations they are studying in and whether these subject combinations affect their career path and global market competition. However, subject consistency and relationship in a given combination and the heaviness or difficulties to study these subjects need further investigation. Rwanda Basic Education Board has a unit of Career Guidance and Counseling in the department of Teacher Development Management and Career Guidance and Counseling that is in charge of helping learners to develop their careers. Therefore, it should transfer its involvement and role in advising students about selecting combinations based on the careers that the students want to develop. Students have to be trained on how to choose a combination earlier, and this can reduce some impact of choosing their combinations. The study tackled how subject combinations affect students' career paths and global market competition in non-exhaustive manner. Such exhaustive study is needed. Deep investigation of the heaviness of studying many major subjects and the subject correlation are of further research interest.

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Declaration of Interest

Authors declare no competing interest.

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Appendix A

Subject Combinations at Rwandan Advanced Level Secondary Schools

Category		**Subject combination**
Science and Mathematics	1	Mathematics -Physics - Geography (MPG)
	2	Physics - Chemistry - Mathematics (PCM)
	3	Physics - Chemistry - Biology (PCB)
	4	Biology - Chemistry - Geography (BCG)
	5	Mathematics - Economics - Geography (MEG)
	6	Mathematics - Computer Sc. - Economics (MCE)
	7	Mathematics - Physics - Computer Science (MPC)
	8	Mathematics - Chemistry - Biology (MCB)
Humanities and social sciences	1	History - Economics - Geography (HEG)
	2	History - Geography - Literature in English (HGL)
	3	History- Economics - Literature in English (HEL)
	4	Literature in English - Economics-Geography (LEG)
	5	Religious Education - History - Literature in English (REHL)
	6	Religious Education - Geography - Literature in English (REGL)
Languages	1	Literature in English - French –Kinyarwanda (LFK)
	2	Literature in English - Kiswahili - Kinyarwanda (LKK)
	3	Literature in English - Kiswahili - French (LKF)

Appendix B

Students' survey (Please Write, Circle or Tick into space or box next to the correct answer or the statement)

1. Gender 1. Male 2. Female

2. Combination: ………………..
3. Which year did you complete the ordinary level? ………………………………

Do you study at the school you have chosen? Yes No

4. Did you select the combination yourself?

Yes
No, the government selected for me
No, the school selected for me

5. (If yes in 5) why did you choose such a combination?

	Statements	Strongly agree	Agree	Disagree	Strongly disagree
1	I perform well in these subjects				
2	I like it				

3	My parents advised me to choose it				
4	When you study this, you get a job				
5	The subjects are not difficult				
6	Other (……….)				

6. (If yes in 5) What do you think was the cause to be given the chosen combination?
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
……………………………………….

7. (If no in 5) What do you think was the cause to be given the combination you did not choose?
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………

8. (If no in 5) what do you think will affect your career?
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………

9. How is your capacity to acquire your studies from your combination?
1. Very high 2. High 3. Low 4. Very low

10. To what extent do you like what you study? 0-25% 25-50% 50-75% 75-100%

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IDENTIFYING IMPLEMENTATION CHALLENGES FOR A NEW COMPUTER SCIENCE CURRICULUM IN RURAL WESTERN REGIONS OF THE UNITED STATES

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Abstract

Like much of the world, the United States is rapidly implementing the teaching of computer science into both primary and secondary school curricula. Uncovering what challenges U.S. schools in general–and rural U.S. schools in the unique environment of more mountainous regions of the U.S. in particular–face in implementing new curricula is not well established in the scholarly literature base. If reform advocates are able to anticipate implementation challenges, they might be more effective in facilitating needed changes. In response, the overarching research question is addressed: What are the challenges of delivering multi-age computer science in the rural, mountain regions of the western U.S.? This two-phase research project first identifies the anticipated challenges to implementing the curriculum by curriculum designers (Phase 1), and then goes on to compare those anticipated challenges to those identified by classroom teachers after completing a teacher training program (Phase 2). Thirteen teachers completed the training program in May and July of 2021, and five were selected to be interviewed. Transcripts of the interviews were analyzed in open, axial, and selective coding to identify recurrent and dominant themes. First, a qualitative methodology through the lens of the constructivist theory was used. Then, conventional narrative inquiry methods were employed to investigate the narratives using thematic analysis. The Phase 1 concerns of adhering to curriculum standards and using appropriate programming languages were contrasted to the Phase 2 themes of the future importance of coding for all students, confidence in pedagogy, the difficulty of coding, and issues of approval and safety. The results of this study serve as a bridge between the mandates created by education leaders and the actual experiences of the participating teachers tasked with delivering the curriculum.

Keywords: *computer science education, teacher education, fidelity of implementation, STEM, professional development*

Introduction

A rural, mountainous region in the western United States might seem like an unusual place to undertake the United States' first attempt at a comprehensive computer science (CS) initiative curriculum inclusion, initiative at both the primary and secondary school levels (Graf, 2021). The region has a unique energy-based economy, the smallest population of any state in the U.S., and in many locations, unstable internet access. However, in 2019, the state

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government authority included a goal of teaching "the use and understanding of computer science" for schools in the region.

This goal for widespread teaching students at all levels foundational concepts of CS is based upon a philosophical notion that 21st Century student requires fundamental knowledge of computers and how computers can be used to solve broad based problems (National Science Foundation, 2014; Northrup et al., 2021). Despite being a laudable goal for schools, little is known about how best to implement CS curriculum widely.

Research Problem

If reform advocates are able to anticipate implementation challenges at the school building level, they might be more effective in facilitating needed changes. As a result, this research aimed to characterize teachers' perceptions of challenges they are about to encounter in their role in delivering CS curriculum in schools. The study-participants were purposefully chosen from the first cohort of teachers who completed a targeted professional development (PD) training program representing teachers from a variety of student ages, subject areas, levels of educational attainment, years of teaching experience, and gender. In a two-phase study, the research team examined the challenges anticipated to delivering CS education and compared the anticipated challenges to those enumerated by the study-participants after completing the training program.

Research Focus

This study was conducted at a small, public, open-enrollment, two-year college in a rural, mountainous region of the western U.S. The college implemented a one-year, 15-undergraduate-credit CS training Skills Certificate in June 2020 using a cohort model. A faculty team designed this training program for licensed and certified teachers of all age bands and disciplines. The first cohort of 13 certified teachers completed the training program in May and July 2021.

Research Aim and Research Questions

For this two-phase research project, the research team has first studied the anticipated challenges to implementing the curriculum by curriculum designers (Phase 1), and then has compared those anticipated challenges to those identified by classroom teachers after completing a teacher training program (Phase 2). The specific, examined gap is the teachers' role in delivering integrated CS education, studied systematically to examine connections made by teachers between this PD and the learning outcomes. Given that curricular reform is an arduous process, a better understanding helps reformers anticipate what teachers need to succeed.

The focus of this research is the overarching question: What are the challenges of delivering multi-age computer science in the rural, mountains regions of the western U.S.?

Research Methodology

General Background

Qualitative methodology was used through the lens of the constructivist theory to pursue the core research question driving this study. Crotty (2020) describes constructivism as the making of meaning (p. 42). In this study of implementation challenges for new CS education, the teachers make meaning from their experiences in the CS training certificate program by taking what they learned and implementing it in the classroom.

Merriam and Tisdell (2015) described the process used in this research, which includes a semi-structured interview using open-ended questions and allowing participants to guide the discussion. In this way, new ideas on the topic emerge as participants' worldview can inform the discussion. Then, narrative inquiry was used to explore the interview transcripts using thematic analysis (TA).

The researchers adopted a two-phase study to examine the anticipated challenges in delivering integrated CS education when developing this CS training program (identified as Phase 1). The study then compares anticipated challenges to those enumerated by the participants after completing the training program (identified as Phase 2).

Sample

Interviewees were purposefully selected from a population of only 13 teachers completing the program. Due to the small population and sample size, it is challenging to generalize the results to an international audience, or perhaps even a nation-sized audience given the geographic size and demographic diversity present. However, this is a limitation of qualitative research in general rather than this study specifically (Wolcott, 1990). While the ability to generalize is a major consideration in quantitative research (Fallon, 2019), it figures less prominently in qualitative work. Of the thirteen teachers who completed the training program in May and July of 2021, five were interviewed for this study.

All cohort members lived and worked in rural areas. They were chosen for this study to represent various years of teaching experience, genders, education levels, grade bands, and specialization areas.

Purposeful sampling was used to "discover, understand, and gain insight" (Merriam, 1988, p. 77). Four of the study participants teach in non-STEM areas and one teaches science. As a group, they represent the cross-discipline design of the statewide CS initiative. Table 1 summarizes the characteristics of the participants.

Table 1
Characteristics of Study Participants

Name	Gender	Teaching Experience (years)	Education	Grade Band	Specialization
Jay	M	21-25	Bachelor's	ES	None/all
Tia	F	16-20	Master's	HS	English/SS
Sam	M	21-25	Bachelor's	HS	Business/CS
Nan	F	11-15	Master's	MS	Science
Sol	M	0-5	Bachelor's	ES/MS	SS/CS

Note: M: male, F: female, CS: computer science, SS: social science,
ES: elementary school, MS: middle school, HS: high school.

The project obtained human subject approval from the researchers' institution, and all participants signed an informed consent. All participants are identified with pseudonyms.

Instrument and Procedures

Narrative Inquiry: All participants are educators with extensive classroom experience. Narrative inquiry captures the experience of these participants as both teachers and students by allowing them to tell their story, then purifying the story into a cohesive narrative. It is a "method of knowing" based on lived experience (Clandinin, 2006). This method allows the interviewees' stories to emerge from open-ended interview questions (Connelly & Clandinin, 1990). Narrative inquiry allows the greatest latitude in understanding this experience and identifying challenges from each teacher's perspective. From this basis of experience, patterns were identified to clarify their lived experiences into themes.

Thematic Analysis (TA): TA was chosen to analyze the teachers' narratives due to its flexibility, accessibility, and systematic approach to coding and analyzing qualitative data. Braun and Clarke (2006, 2012, and 2020) provided guidelines and context for its use in qualitative analysis. Specifically, they posited that TA is most appropriately used to identify participants' lived experience patterns.

Kiger and Varpio (2020) expanded on the work by Braun and Clarke, offering careful definitions for *TA* and *theme*. TA is valid within post-positivist, constructivist, and critical realist research approaches without being tied to a particular paradigmatic orientation.

Braun and Clarke (2012) and Kiger and Varpio (2020) recommended the six-phase approach to the process of TA used in this research study, presented in Table 2.

Table 2
Six-phase Approach to Thematic Analysis

Phase	Description
1	Familiarizing oneself with data
2	Generating initial codes
3	Searching for themes
4	Reviewing potential themes
5	Defining and naming themes
6	Producing the report

Credibility and Trustworthiness (Reliability and Validity): It is important to articulate the correlation between trustworthiness and both reliability and validity in establishing the credibility of this study. Krefting (1991) described a conceptual model for evaluating the reliability and validity of qualitative research. As much of what is known about these concepts derives from *quantitative* research, Krefting argued that one cannot apply these concepts directly to qualitative data. For example, external validity is the ability to generalize from a sample to a population. However, the ability to generalize is a major consideration in quantitative research but figures less prominently in qualitative work. For this reason, external validity is not applicable for many qualitative research studies.

However, trustworthiness is relevant to both qualitative and quantitative research, although it takes different forms. Guba (1981) identified four aspects of trustworthiness: truth value, applicability, consistency, and neutrality. The truth value is synonymous with credibility. When study participants possess special insight into the studied subject, they establish credibility. Applicability is similar to generalizability. Similarly, as it refers to transferability, consistency is a key objective of quantitative research. Due to the nongeneralizable nature of a qualitative inquiry, consistency is less important. Neutrality, or freedom from bias, is based upon conditions of the research and the informants (Guba, 1981). For this study, truth value (credibility) and neutrality are the basis of trustworthiness and rest on the expertise and lived experience of the research participants.

As credentialed, experienced teachers, all participants have special insight into issues of classroom instruction. Pidgeon et al. (2004) argued that this special insight is a criterion for trustworthiness. In qualitative methodologies, validity and reliability are often established through external auditing and triangulation. However, given the nature of the participants, trustworthiness, rather than validity and reliability, is established by the truth value and neutrality.

Interview Questions: Interviews were conducted with each participant between June 1 and August 2, 2021, using the Zoom online videoconferencing platform. In each interview, the participants were asked six open-ended questions. The interview questions are provided in the Appendix A.

Procedures: The anticipated challenges were delineated by the faculty team and then compared to the challenges identified by the interviewees. The following process was performed to develop codes from the interview data and organize the codes into themes.

1. The first author interviewed each participant. The interviews were conducted between June 1 and August 2, 2021, after each participant had completed the CS training program prior to their subsequent teaching of CS.
2. The interviews were conducted using the Zoom videoconferencing platform. All interviews were conducted with only the interviewee and interviewer present.
3. The interviews were recorded using the Kaltura video platform and were stored privately on the college's media site.
4. The recorded interviews were transcribed using the Kaltura video platform.
5. The interview transcripts were analyzed for themes using the six-phase approach to TA described by Braun and Clarke (2012) and Kiger and Varpio (2020).
6. The Delve software tool for analyzing qualitative data (Twenty to Nine LLC, 2021) was employed to organize the codes into themes and identify patterns among interviewees.

Data Analysis

This two-phase research project first identifies the anticipated challenges to implementing the curriculum from personal conversations with curriculum designers (Phase 1). Then researchers analyzed unedited transcripts of interviews conducted with teachers who completed the PD (Phase 2). By searching the interview transcripts for words and phrases in the interviewees' own words, a combination of descriptive coding and in vivo coding was used (Ho, 2020; Fallon, 2019). Delve software (Twenty to Nine LLC, 2021) facilitated the six-phase approach by Braun and Clarke (2012) and Kiger and Varpio (2020). From the codebook developed, four themes emerged. These themes were then compared to the challenges anticipated by the faculty team as they worked from government provided *WDE Computer Science Content and Performance Standards* reform documents (2021). Then, themes were identified to provide important insights concerning the research question (Kiger & Varpio, 2020). These codes were formed using the iterative process of coding, analytical writing, and categorizing. The distribution of codes provides an amalgamated overview of the topics identified by the participants and forms the basis of the TA.

Research Results

From the data analysis, of the interview transcripts, four themes emerged. These themes are tabulated below in Table 3.

Table 3
Frequency of Qualitative Codes in Cohort Member Interviews in Descending Order

Code	Noted by #	Count
CS is the future	5	29
Confidence in pedagogy	5	19
Coding is difficult	5	15
Approval and safety	4	9

Three of the four themes were mentioned by all five interviewees; the fourth was mentioned by four interviewees. These themes were then compared to the Anticipated Challenges found in Phase 1.

Phase 1: Anticipated Challenges

Phase 1 uncovered two challenges anticipated by the faculty team in integrating CS into existing curricula. These challenges are described below (Dechert and Floyd, personal communication, December 2, 2019).

Anticipated Challenge 1: Teaching to State Department of Education Standards. The faculty team developed the CS training program curriculum based upon the seven practices delineated in the State Computer Science Content and Performance *Standards* (2021). These practices are presented in Table 4.

Table 4
State Department of Education Computer Science Content and Performance Standards

Practice	Description
1	Fostering an inclusive computing culture
2	Collaborating around computing
3	Recognizing and defining computational problems
4	Developing and using abstractions
5	Creating computational artifacts
6	Testing and refining computational artifacts
7	Communicating about computing

Because the content and performance standards are broader than the two-year college's traditional CS offerings, two new professional development training courses (Application Development and Social Media for Teachers) were created; and one course (Robotics) was modified from an existing catalog course. Combining these courses with two existing catalog courses (Introduction to CS and CS I) allowed the faculty team to round out the curriculum and address each standard in a meaningful way. Table 5 delineates the connection between each course and the Content and Performance standards addressed.

Table 5
Standards Addressed by Each Course of the CS Training Program

Course	Standards
Intro to CS	3 4 5 and 6
CS I	3 4 5 and 6
Robotics	2 and 3
Application Dev.	5 and 6
Soc. Media for Teachers	1 2 and 7

Note: (WDE, 2021; Northrup et al., 2021)

Anticipated Challenge 2: Choosing Appropriate Programming Development Environments and Languages. As with designing any CS course, a core question is which languages and programming development environments are best used to teach structured programming. The two existing catalog courses – Introduction to CS and CS I – were used to teach structured programming in Matrix Laboratory (MATLAB) and microprocessor without interlocked pipeline stages (MIPS) Assembler and Runtime Simulator (MARS/MIPS) development environments. Before offering the CS endorsement, the audience for these courses were primarily CS majors, so the languages used to teach structured programming were oriented toward solving mathematical problems. The faculty team debated introducing numerous languages and ultimately decided to continue using MATLAB and MARS/MIPS in Introduction to CS and CS I. It was further decided to use Python and Scratch in other courses and evaluate the use of these languages after completing the first cohort.

Phase 2: Identified Challenges

Phase 2 examines the challenges identified by participants to the delivery of integrated CS education based upon their experiences in the computer science training program. The themes found in Phase 2 are presented below; a summary of the interviews is provided in Appendix B.

Theme 1: Computer Science is the Future; If We Do Not Do This, We Will Fail Students. The first major theme that emerged from this research study was the teachers' conviction that CS is the future. All participants noted this theme, which was mentioned 29 times in the interviews. This theme was noted between three and nine times by each participant and did not correlate with a particular grade band. The interviewees considered CS a necessary element of the curriculum for all students. All participants cited examples of technical and nontechnical careers requiring CS knowledge. Further, they cited life skills requiring computer knowledge, such as using computer-based scheduling systems, navigating with a GPS, and even ordering food with computer applications. As middle school science teacher Nan said, "The technology piece? There's no way around it. We need to bring back innovation and creativity, and if we are not learning it now, we are behind already."

Theme 2: Confidence in Required Pedagogy. The participants all noted that a required pedagogical shift is required to teach CS. In the traditional classroom, the teacher is the subject expert, and the students learn from the teacher. With CS, the students may know more than the teacher, and the teacher must accept students' expertise. Jay noted, "[We] are teaching students to live in a world that they probably understand better than we do," and learning along with the students is a necessary part of teaching CS.

Conversely, the teachers noted that teaching and learning in an egalitarian classroom engender confidence in the students. When students are content experts in a particular area, they teach that content to their fellow learners, including the teacher. This act of teaching and learning generates confidence in the student expert.

Theme 3: Coding Is Difficult for this Population. At the college level, coding is generally taught by and to computer scientists and engineers. When STEM students are taught to code, they are generally familiar with the concepts of computational thinking (CT) and encounter few difficulties with basic conceptualizations.

The participants of this study had a different experience. Although the participants are successful academics and expert learners, the basic ideas of CT and coding were foreign to them. Each participant discussed the difficulty of learning foundational concepts, describing the act of writing computer programs as “daunting”, “mind-boggling”, and “difficult”. They found themselves out of their element with CT and were surprised by the degree of explicit instruction required when coding. Tia equated coding to giving clear and straightforward instructions to a person. She said, “You can’t tell a robot or a teenage boy to mow the lawn; you have to be very, very specific [and say] if you hit a tree back up and go a little bit around the tree and then come back.”

Theme 4: Approval and Safety. Four of the participants cited concerns about administrative approval and safety. These concepts are interrelated, as administration and trustees are cautious about allowing internet use in schools due to security issues. These stakeholders are uneasy about the presence of danger to students who use the internet. While the participants acknowledged the risk, they also felt the benefit of guided internet use would outweigh these concerns. From an instructional viewpoint, the availability of excellent resources should be balanced against the potential safety issues to provide students with a rich educational experience, including internet use. Sam suggested that this fear is a product of anecdotal experience. He said, “I interviewed my superintendent and my principal in general about CS in the classroom; [they had] preconceived notions that ‘there ain’t no way I’m doing that’ because one time in class one person called another person a name, and it goes bad.” Sam allayed their fears by describing ways to monitor and prevent bullying, concluding that internet use can be safe when properly monitored and guided.

Comparison of Phase 1 and Phase 2:

This research project endeavors to characterize teachers’ perceptions of their role in delivering integrated CS education. A specific focus was to compare the challenges anticipated by the faculty team while they developed the curriculum to the challenges identified by the teachers who completed the CS endorsement.

The anticipated and identified challenges were compared and contrasted, then aggregated and interpreted. Finally, the results were analyzed.

On initial inspection, there were no significant similarities between anticipated and identified challenges. The faculty team anticipated challenges of teaching to all WDE standards and choosing appropriate programming languages. The participants identified preparing students for the future, confidence in pedagogy, difficulty learning to code, and administrative approval as challenges. Upon close study, a similarity was uncovered between anticipated Challenge 2: choosing appropriate programming languages and identified Challenge 3: coding is difficult. Identified challenge 3 was mentioned by every participant and was the most frequently mentioned theme. No participant explicitly mentioned the programming languages or environments, but inspection of the transcripts revealed a major connection related to universal difficulty in Introduction to CS and CS I, with writing code as the most common theme. This was not mentioned with the other classes, where different programming languages were used. It follows that the programming languages themselves were challenging for participants.

Since the faculty team had chosen to use these two existing classes to teach structured programming, the participants had been taught the same programming languages (MATLAB and MARS/MIPS) as the faculty team had used in the past to teach CS majors. These languages are very effective for teaching CS students but are not particularly accessible to novice programmers. Moreover, MARS/MIPS is a machine-level language, and is notoriously difficult to learn. Participants' concerns with the difficulty of programming may be partially attributable to using these languages.

In Robotics and Application Development, the teachers used a variety of programming languages, including Python, Scratch, and a Lego Mindstorm language based on the C programming language. These languages are much more accessible, high-level languages, and participants did not mention difficulty in these classes. This further supports that MATLAB and MARS/MIPS programming languages were the actual challenges identified in Theme 3.

As a result of this finding, the faculty team will modify the choice of languages employed to teach structured programming and will employ more accessible programming environments for future CS training program offerings. Future participants will then be interviewed to determine whether this challenge has been resolved.

Discussion

Literature Review

A review of the literature has identified a need to study integrating CS education across curriculum in a systematic manner. This study elucidates this need.

In this literature review, the reader's attention is directed to this gap, beginning with the current state of CS education integration, and leading to the current PD trends for CS teachers. Finally, the gap has been identified as a disconnect in the systematic study between PD and learning outcomes; specifically, the relationship between challenges anticipated by the faculty development team compared to the challenges identified by the cohort members.

Integrating Computer Science Education/Computational Thinking into Discrete Subject Areas: Numerous authors have written about teaching CS in an integrated manner. Foremost among them, Wing (2006, 2011) is a foundational researcher in the field of CT as it applies in K-12 education. Wing defined CT as "a process that involves solving problems, designing systems, and understanding human behavior, based on the fundamental concepts of computer science." Although CS encompasses CT and coding, the three are not synonymous. While CT permeates human culture, in the past, it was the purview of scientists and engineers. However, Wing argued that it is a foundational skill on par with reading, writing, and arithmetic, required by everyone in the 21st century.

Building on Wing's research, Webb et al. (2017) identified CT and CS curriculum design as a key area for future research that is important from the perspective of curriculum theory and is a necessary element for student empowerment. Building on Wing's foundational work, Barr (2011) made a connection between problem-solving and CS. More recently, Borowczak and Burrows (2019) refined this thinking by defining CS as "the science of problem solving within a computational context" and framing CT as a connection between CS and the visible practice of computer programming.

Fessakis and Prantsoudi (2019) posited that the teachers' perceptions and misperceptions about teaching CT require future study. Teaching CT across the curriculum rather than as a discrete subject area requires a pedagogical shift to using CS theory to teach the more general ideas of CT, rather than as an end goal of a discrete subject (Sentance & Csizmadia, 2017). Pedagogy for teaching CT includes scaffolding programming tasks and collaborative learning in addition to the traditional methods of teaching coding. In this way, CT is the goal of education, and coding is the primary tool for teaching CT. Although Wing has carefully defined CT and its relationship to CS and coding, the terms are often not carefully defined or differentiated in common use or within the academic literature (Grover & Pea, 2013).

Recently, initiatives have been undertaken to provide students with CT opportunities, and *Computer Science For All* (CS4All) is one such initiative. By examining the core purposes envisioned by different stakeholders, Vogel et al. (2017) identified seven core required principles for effective universal CS education, including pragmatic CS issues (workforce, citizenship, and innovation) and larger issues more closely associated with CT and social justice (equity, literacy, school reform, and personal fulfillment and fun). Webb (2017), Hubwieser et al. (2014), Hodhod et al. (2016), and Gray et al. (2015) have proposed new ways to teach CS, CT, and coding based on different principles of curriculum design. These designs share core principles of creating sustainable models based on established teaching practices and pedagogy, differing mainly in the definitions of the key concepts of CT, CS, and coding and the relative importance of these core principles.

A review of the literature reveals that the terms "computational thinking," "computer science," and "coding" are often conflated or used interchangeably. While these terms are intricately related, they are not identical (Borowczak & Burrows, 2019). Regardless of the term used, there is a great deal of support in teaching them across disciplines rather than as discrete subjects (Burrows & Slater, 2015). CS education in our state will be taught by STEM and non-STEM teachers alike; thus, our state's model is based on teaching CS in an integrated environment, consistent with the WDE Computer Science Content and Performance Standards (2021).

K-12 Teachers' Perceptions and Experiences in Teaching Computer Science: Preparing teachers to teach CS/CT is another topic in the literature. The researchers delved into this topic, as it is important for an integrated model of CS education. Yadav et al. (2016) discussed the current trend of educating noncomputer scientists to teach CS and focused on these teachers' perspectives as they deliver CS curriculum, their lack of adequate CS training, and the isolation they feel from often working alone. Yadav and colleagues are not the only authors concerned about this issue.

Astrachan and Briggs (2012) addressed not only coding but also the creative and intellectual aspects of CS. In this way, they referred more to CT than CS. ChanLin (2007) focused on teachers' perceptions of the importance of integrating CS into their classrooms, whereas Goode et al. (2014) studied the role of teachers in teaching CS. This research study explored the applicability of PD models and asserted that curriculum alone is not enough: Teachers require well-constructed PD and support to teach CS effectively. In this way, Goode et al. separated and related the knowledge of CS from the practice of teaching CT. In follow-up research, Goode et al. (2014) set up the connection between educational research related to PD for CS and CT teachers, describing the Exploring Computer Science PD model.

Gray et al. (2015) described statewide PD models for teacher preparation for CS teaching in Alabama. The project, entitled CS4Alabama, is a year-long PD using a teacher leader model of mentoring new CS teachers. Although this report predates our state's model, the core principles are similar in most cases.

Along this line of research, Lee et al. (2020) made connections between established STEM subject areas and CS integration, describing a model for in-service teacher PD that is valuable for integrating CS by making connections between STEM fields and other areas of study. Similarly, Borowczak and Burrows (2019) studied NetLogo as a platform for teacher PD for integrating CS into the curriculum. The results revealed that classroom applications were limited to topics addressed in the PD.

In summary, the relationship between CS, CT, and coding is a current focus in the academic literature. Integrating CS and CT into new and existing curricula has been examined using different approaches and different coding platforms. From this work, a view of connecting CS, CT, and coding through effective PD is emerging and new areas for potential study are being revealed.

Literature Gap: While it is apparent that CS, CT, and coding have been studied extensively from the

viewpoint of teachers' PD and the classroom, the following gap in the literature was identified. In applying the systematic study of CS education as it is integrated across discrete subjects, there is a disconnect between traditional teacher preparation, which focuses on one or two distinct disciplines, and integrated STEM (iSTEM) education. Hewson (2007) and Burrows and Slater (2015) pointed to this gap, stating that integration is crucial to teaching iSTEM using a contemporary approach.

Although PD among STEM teachers has been studied and connected to national standards, this gap exists in systematically studying PD, especially regarding the connection between PD and learning outcomes (Jackson et al, 2020). In another reference to this gap, Hubwieser et al. (2014) stated that there is still much to be done in when CS is integrated across discrete subject areas. By connecting the work by Hubwieser et al. with that by Hewson (2007) and Burrows and Slater (2015), the gap in the literature is highlighted, indicating a need to study integrating CS across a curriculum systematically. This gap is targeted in this research project.

Contextualization of Research

In this state, the Department of Education provides content and performance standards for guidance and direction to school districts; in turn, the districts are responsible for implementing education for all students. Certified teachers serve as the link between the standards and implementation.

The state studied has resolved to rely on certified teachers to deliver universal CS education instead of relying on content specialists, or even STEM teachers exclusively (WDE, 2021). The faculty development team must recognize that the PD participants do not have a background in structured programming, CS or CT, and the coursework must be designed to take this into account. For these reasons, programming language and environments that are appropriate for CS and engineering majors may not be appropriate for participants in a CS training program.

Further, the state studied has also resolved to teach CT across the curriculum rather than as a discrete subject area. This will require classroom instruction based on the more general ideas of CT, integrated through subjects, rather than focusing on CT as an end goal of a discrete subject (Sentance & Csizmadia, 2017). This is expressed in the Content and Performance Standards developed by the state's Department of Education (2021).

Beginning in the fall semester of 2022, all schools within the state will be required to provide CS education (WDE, 2021). As CS delivery becomes more widespread, training programs must remain responsive and teach appropriate languages and environments to bridge the gap for teachers who may have no formal training in CS.

However, by relating anticipated and identified challenges to the academic literature on CS education, this study may inform school districts, states, or other administrative units regarding the design of universal compulsory CS education. Further, the study will inform the faculty team when choosing programming environments for the future.

Conclusions and Implications

As schools in this rural state approach the implementation date for universal CS education integrated across the curriculum, providing PD to certified teachers to teach CS has begun. The regional government's decision to create training programs for all certified teachers to teach CS within their grade bands, rather than rely on content experts or STEM teachers, requires that PD be carefully constructed to meet their needs.

At the two-year college studied, a faculty development team was empaneled to create a CS training program to qualify certified teachers to teach CS. The team anticipated challenges (Phase 1) that the teachers would experience. These anticipated challenges were compared to the identified challenges (Phase 2) that the teachers encountered while completing the training program.

The main challenge, both anticipated and identified, was in regard to the choice of programming languages and environments used to teach structured programming. The languages and environments chosen by the faculty development team had been used successfully to teach structured programming to CS and engineering majors. Through the training program, the team learned that these languages and environments were not appropriate for teachers who have no background in structured programming.

In order to deliver curriculum that remains appropriate for the times, teachers must understand foundational structured programming. The PD must include not only applications for immediate classroom use, but structured programming to teach foundational CS skills. Choosing more accessible programming languages and environments is key to success. For this reason, PYTHON will replace MATLAB and MARS/MIPS to teach structured programming, beginning in the 2022 school year.

CS is evolving quickly, so teaching CS must remain responsive to change. CS training programs must provide foundations as well as applications in order to prepare teachers to understand the foundations of CS and CT and remain responsive in a rapidly changing classroom. Continuing research and innovation will be needed for the state's CS education to remain relevant. This is an evolving field of study and continuing research will be required to continually provide students with meaningful CS education.

This research study is the second of a three-study research project and serves as a bridge between the first and third studies. The first study is archival research regarding K-12 CS education curriculum in the targeted region. The third study will investigate the differences between expectations and reality for the teachers' experiences as they complete the CS training program and implement the material from the program into their classrooms. These three research studies form a body of work that comprehensively describes the experience of delivering CS education in the targeted region from the viewpoint of the teachers who have completed the CS training in May and July 2021 by addressing a current literature gap of studying educational programs in a systematic way. Recognizing the differences between CS students and teachers seeking CS endorsements will lead to different choices of programming design environments and languages for these two distinct groups. Finally, future research studies can focus on integrating CS education across discrete subject areas, as suggested by the literature gap studied in this research project. By recognizing a disconnect between traditional teacher preparation, which focuses on one or two distinct disciplines, and STEM education, which requires integration across disciplines, improvements may be made to PD programs in CS.

As universal CS education is implemented, changing programming languages for the CS training program is a current task. This change will be undertaken in the spring 2022 semester for implementation beginning in the summer 2022 semester for the third cohort.

Declaration of Interest

Authors declare no competing interest.

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Appendix A: Interview Questions

Interviews were conducted individually between June 1 and August 2, 2021, using the Zoom online platform. In each interview, the interviewees were asked the following open-ended questions.

1. From your point of view as an educator, how is universal, compulsory computer science education important to:
    - A. Your students?
    - B. Your school district?
    - C. The future of our state and region?

   What specific benefits do you think students will gain? Due to the already crowded curriculum, what tradeoffs raise your concern?

2. What specific skills and knowledge from the computer science training program do you foresee that you will be readily able to use with your students and apply in your classroom? What learning activities will be most influential on your future teaching?

3. What is your action plan in applying specific computer science skills you have learned in the computer science training program to your classroom?

4. In terms of specific instruction and overarching issues, do you see compulsory computer science education as a vehicle for student empowerment? Do you envision this to be different for different groups of students (for example, college-bound, CTE, etc.)? If so, in what ways?

5. What other issues surrounding the delivery of universal computer science education in our state and region would you like to address?

6. What else would you like to add to this discussion?

Appendix B: Summary of Interviews

The following excerpts summarize each interview as it relates to the research question.

Jay: “In computer technology, everything changes so quickly. The trick is not doing this in one great district but doing it everywhere.”

The first author interviewed Jay on June 25, 2021. The first author has known Jay for approximately 20 years. He earned his first degree, an associate of applied science in photographic communications. He completed his bachelor’s degree in education from an experimental distance program delivered in his town of residence. He has been teaching in the same district for over 20 years.

Jay believes that our state needs to keep innovating and looking to the future, and CS education is foundational to innovation. In addition, iPads and other devices are available to most students in his district, and he felt that device availability promotes computer literacy. As telework becomes common, the students’ knowledge of computers will help them live and work in our rural state after they graduate. Instituting universal CS education will level the playing field. All students deserve the same opportunity, and CS is foundational to the equality of opportunity.

Regarding the challenges he faced in the CS training program, he found that, as his first class, coding was difficult, and he was concerned that this sequence might discourage teachers from starting the program. He would have benefited from more technical support in the beginning. Although learning the assembler was important for understanding the history of coding, he believed that teachers learn differently than traditional CS students. Overall, he felt that the program was well constructed and met a need in the school districts but suggested evaluating the sequence of classes.

At the interview's conclusion, Jay mentioned that he would have benefited from more personal help when learning to code. He speculated whether using lab assistants would facilitate differentiated instruction and whether this would be a good model for teaching coding in schools. In closing, Jay stated, "Universal computer science instruction will be necessary for the future when everyone will need computer literacy to live effectively in society."

Tia: "Computer programming is a form of communication. Education changes as the world changes, so we remove that which is obsolete and replace it with what is currently important."

The first author interviewed Tia on June 10, 2021. The first author has known Tia for approximately 10 years. Tia has an associate of arts in elementary education from the same two-year college where she earned her Computer Science endorsement, then earned bachelor's degrees in history and secondary education from a university in another state. She also holds a master's degree in curriculum and instruction. She taught in a different region for two years before moving back to her current location, where she is in her 18th year of teaching U.S. history and English at the High School level.

Tia discussed the tradeoffs needed to fit CS into the curriculum. While keyboarding and other basic skills will be pushed back to elementary, Tia stated that she is not very concerned about the time constraints. Districts will be able to evaluate outdated curriculum elements, such as typing, and although students are currently allowed to choose between electives, such as U.S. firearms education and technology/CS, this will change with time, and CS will move from an elective to a requirement. Tia stated, "Computer science will become a universal requirement at all levels of and probably K-16."

When discussing her experience in the provided CS training program, she first focused on troubleshooting, beginning with the learning management system (LMS), which has immediate classroom applicability. She mentioned building her confidence in making her LMS pages more user friendly. Troubleshooting and confidence go hand in hand. Students will not try to fix a coding problem without confidence. She said her students have different levels of confidence. She discussed her male students in advanced placement CS class or those on the robotics team as having abundant confidence.

Sam: "In the end, language and coding [are] not the biggest deal; it's all about problem-solving."

Sam was interviewed on June 8, 2021. The first author met him through the cohort. Sam began his academic career in journalism, earning a bachelor's degree in radio and television from a southern university. Later, he earned a bachelor's degree in education. He has taught business and career and technical education (CTE) for 21 years. For the last five years, he has also taught CS and coding. In addition to the CS training program, Sam has completed teacher training through code.org.

Sam identified problem-solving as a central principle of CS. Regarding specific gains for students, using computers allows students to gain confidence in computing and problem-solving. With confidence and experience, students can use computers as tools to solve problems in other academic areas and in their lives.

When asked if he was concerned about the tradeoffs required to incorporate CS into the already crowded curriculum, he stated that he does not see this as a problem. For example, there has always been room for computing in his personal finance class. He expressed his appreciation for the published CS standards because they give him goals to pursue with his students. He has found that he can address approximately 25% of the standards in applications courses. His process is to integrate CS and technology into other subjects while addressing CS standards.

As the interview finished, Sam noted that CS is a great vehicle for individualized instruction, allowing him to meet students where they are in terms of skill. In his current CS and coding classes, he employs individualized instruction because his students are at different skill levels. With 16 students, there may be 16 different problems being solved concurrently. The most effective teaching method is differentiated instruction. He also noted that students learn especially well when actively engaged in programming. In the last couple of years, he has found that his students want to get to work instead of listening to him for very long.

Nan: "The technology piece? There's no way around it. We need to bring back innovation and creativity, and if we are not learning it now, we are behind already."

The first author interviewed Nan on June 1, 2021. The first author met her through the cohort. Nan has an associate's degree from a Community College in a neighboring state, a bachelor's degree in microbiology from another neighboring state, and a master's degree in education from an online university. She has been a Middle School science teacher for 12 years.

Nan felt that technology and CS provide students with a well-rounded education. We need to teach what students will need and level the curriculum so that students are not spending more time on math and reading than everything else. We need to blend and balance, assigning equal weight to all STEM fields, including CS. While schools focus on reading, writing, and mathematics, the statewide science test scores indicate that only 46% of students in our state are proficient in science. We must prepare students for "jobs that have not been created," so we need to validate the importance of CS alongside other core subjects to help prepare students for the future.

When asked about what tradeoffs raise her concern, given the already crowded curriculum, Nan stated that this is always the scramble, especially for elementary teachers, because school district administrators tend to add teaching requirements without removing anything. She sees a need to be innovative and creative to round out the curriculum. We must prepare students for their futures, and there is no way to do that without CS. Students should learn CS in early elementary school, and it should be part of the core subjects along with mathematics and English. She acknowledged that this is a hard sell to many stakeholders, but CS is necessary for a modern curriculum. We also need to examine what drives the time allocation and curriculum and ensure the focus stays on the students. For example, can stakeholders evaluate whether they are obtaining "bang for our buck" regarding reading at the grade level? Are there strategies other than pulling the students from social studies, science, and other subjects to help them? What if we scaled back mathematics and English interventions and simultaneously enriched other curricular areas? She concluded by stating that "we need to seek balance and make sure all subjects are given the appropriate weight."

Sol: "Our future is technology; it's not an option, it's reality."

The first author interviewed Sol on August 2, 2021. The first author met him through the cohort. Sol has a bachelor of science degree in secondary education–social studies. He has recently started work toward a master's degree in administration. He began his degree work at a southern state college, where he played baseball, then transferred to the university in his home state to complete his degree. He completed his CS training in May 2021. Sol and his wife taught in an urban school system, then moved home a year ago to teach in a local school district. Last year, he divided his teaching duties between High School student support and sixth-grade social studies. This year, Sol serves as the Middle School CS instructor.

Sol began the interview by saying that CS and technology are ubiquitous and important to the students, school district, and future of our state. All schools are implementing technology as an integrated part of teaching and learning. Paper is becoming "a thing of the past" in many areas. Due to the changing nature of information literacy, students need to learn where to go and not go on the internet when using digital sources. The internet is pervasive throughout his school district and the world at large, so teaching students how to use technology is necessary for all aspects of life. He posited that educators need to accept this as reality.

He was not overly concerned when asked what concerns he had regarding tradeoffs in the already crowded curriculum. He will be teaching technology and CS as an elective, and his class rosters have full enrollment, indicating that students acknowledge CS as the path forward to the modern world. Technology is not an option; it is a reality, and teachers need to integrate it into everything taught.

Other concerns include a potential barrier to using social media in the classroom. He felt that his administration has a limited view of what is appropriate and acknowledged that students are distracted by the internet if he does not check on them continually. There could be an issue with students going to forbidden sites, but overall, he feels responsible cyber-citizenship is beneficial and that the good outweighs the bad. He will push for allowing social media and internet access to play a role in his classroom.

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PERSONAL AND PROFESSIONAL EMPOWERMENT OF REFLECTIVE PRACTITIONER TEACHERS DURING THE COVID 19 PANDEMIC

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Abstract

Reflective practitioner teachers should critically review their own work and introduce innovations that should improve everyday educational practice. For this reason, the focus of the research is on the personal and professional empowerment of reflective practitioner teachers during the SARS-CoV2 pandemic. 355 teachers from the Republic of Serbia participated. The empirical research used descriptive methods and techniques of scaling and surveying with an instrument specially constructed for the needs of this research - Questionnaire with assessment scale (RP-COV-19). The results show that the most common form of empowerment is attending online seminars, while teachers rarely attended online classes of colleagues from the school where they work and colleagues from other schools. Teachers' perceptions on the use of the Internet in the aspect of personal and professional empowerment are very positive. Teachers generally rate their training and engagement during the pandemic with the highest marks (four and five), while there were no negative marks at all. Reflexivity accompanied by personal and professional empowerment must be given priority by teachers, because in today's process of education, reflective practitioners are considered successful teachers.

Keywords: *teacher reflective practitioner, professional empowerment, the Covid-19 pandemic, empirical research, improvement of educational practice.*

Introduction

Since the middle of March 2020 in the Republic of Serbia, due to the impact of the SARS-CoV2 pandemic, there have been significant changes in the system of education. This period of education during the pandemic is described by many studies (Adnan & Anwar, 2020; Abuhammad, 2020; Franchi, 2020) concerning the quality of online teaching, student and teachers' productivity.

During the pandemic, not only did the students have difficulties in learning and adapting to new conditions, but the pandemic also affected the professional aspect and the strengthening of the teaching staff. Today, the focus is increasingly on reflective teaching in order to support and apply good models and examples in teaching (Shin, 2021). Starting from the fact that reflective practice is considered an indispensable component of modern educational work, this article will try to present reflexivity as an important prerequisite for personal and professional empowerment of teachers during a pandemic caused by the ferocious SARS-CoV2 virus.

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It presents some of the definitions of the term reflective practice that are mentioned in contemporary literature. “Reflection can be seen as a catalyst for new and better ways of thinking, acting and acknowledging the complexity of teachers' work” (Tonna et al., 2017, p. 212), while reflective practice can be defined as “looking back on previous experience and finding meaning in it to identify the activities that need to be carried out in the future” (Drew & Bingham, 2001, p. 221). “Reflective practice in work is considered a continuous process based on reflective thinking and learning from experience based on which the teacher plans, implements, evaluates and introduces improvements in their own practice, and develops creativity and innovation with different ideas” (Bilač & Miljković, 2016, p. 358). Therefore, reflective practice seeks to uncover covert teacher questioning and turn certain assumptions into explicit statements (Bawaneh et al., 2020).

Reflexive competencies represent an extremely important segment in the development of professional competencies of teachers (Ivanova-Armeykova, 2020). One of the key features of a competent teacher is reflective practice, which requires him to rely on his own knowledge and skills in order to perform educational work effectively (Rosenberg et al., 2004). In order for teachers to become successful reflective practitioners, “they must continually challenge the underlying beliefs that drive their current behaviour” (Larrivee, 2000, p. 301).

Taking into account the presented, the success of a reflective practitioner teacher implies active re-examination of one's own work through a spectrum of different forms of improvement, nurturing and improvement of professional competencies. Thus, reflection is an indispensable aspect of professional empowerment of teachers and their teaching practice because it provides an opportunity to be original, innovative, dedicated, and responsible for their own work and the outcomes of their work (Zawadzka-Bartnik, 2014). Professional development implies intensive acquisition and improvement of knowledge and skills in order to provide students with quality learning opportunities (Gess-Newsome, 2001). Therefore, the aspect of professional empowerment of teachers is reflected in the creation of a stimulating environment for students, which is essential in improving the quality of learning.

Teachers' self-initiative in the aspect of personal and professional empowerment is reflected through successful classroom work, personal satisfaction of teachers and the presence of a higher level of student motivation in the learning process. Therefore, in the Republic of Serbia, one of the indispensable obligations of teaching staff is to attend certain seminars and other forms of professional empowerment and training of teachers (Radić-Bojanić & Radisavljević, 2017). The mentioned forms of empowerment could not be realized by teachers in contact due to the presence of the pandemic, so the possibility of online training and empowerment was only achievable. During the pandemic, teachers had to move to a different system of teaching, grading, and evaluating both their own and students' work. The fact is that even those teachers who had insufficiently developed digital competencies must follow the dynamics and ways required by the current situation. In the Republic of Serbia, tribunes, educations, and seminars are very current ways of training in order to better achieve the educational process. In addition to primary and secondary school teachers, university teachers also had to adjust their way of working to the conditions of education during the pandemic. The dominant way of working is combined teaching and a complete online system of work. All of the above requires adaptation skills, professional development and the readiness of teachers to work and learn new skills, which is a key feature of a reflective practitioner teacher.

Research Problem

During the pandemic period, the forms of training received a new, changed form by being realized online. The good sides of this way of empowering teachers are saving time, money, strengthening digital competencies, as well as coping and adapting to the new situation.

As personal and professional empowerment of teachers is an inevitable factor in creating a successful educational process, with this paper we sought to examine the commitment to personal and professional empowerment of reflective practitioner teachers during the SARS-CoV2 pandemic. The focus of interest in this issue is based on the perceptions of teachers, how they coped with situations of sudden transition to online teaching, as well as whether they needed support, empowerment in terms of professional development in this area. So, the problem with this research is: *did teachers pay attention to personal and professional empowerment during the SARS-CoV2 pandemic?* This research is considered necessary because the teaching in the conditions of the pandemic in Serbia has changed a lot, which could have affected the quality of teaching, but also the professional aspect of the teaching profession. The reflective practitioner teacher is characterized by coping in challenging situations as well as the need to reconsider their own work. In this sense, these two current topics, teaching in the conditions of the SARS-CoV2 pandemic and the teacher reflective practitioner are related and in synergy represent the problem of this research.

Research Aim and Research Questions

The aim of research was to look at the personal and professional empowerment of reflective practitioner teachers during the SARS-CoV2 pandemic. The following research questions were asked: what qualities should a reflective practitioner teacher possess; whether there is a statistically significant difference in professional empowerment and training during the pandemic in relation to gender, length of service and education; what are the most common ways of personal and professional empowerment of teachers during a pandemic; whether the use of the Internet is represented in the personal and professional empowerment of reflective practitioner teachers; whether teachers cooperate with colleagues in order to improve reflective practice; how do they assess personal and professional empowerment and engagement? These research questions are very important in conventional, regular conditions, and the basic tendency of this research is to examine this issue in pandemic conditions.

Research Methodology

General Background

As professional empowerment is an important predictor of a high-quality teacher, it was explored and examined the commitment to personal and professional empowerment of reflective practitioner teachers during the SARS-CoV2 pandemic. Due to the known unfavourable epidemiological situation due to the SARS-CoV2 virus, the research was conducted by filling out an online questionnaire with an assessment scale. This is empirical research, and a quantitative method has been used. The research was conducted in April and May 2021 via the Google questionnaire.

Sample

The sample consists of 355 in-service teachers from the territory of the Republic of Serbia. The research was conducted by means of the Google questionnaire and the participation in the research was voluntary. The cross-section was made for 355 respondents because no completed ballots arrived for a long time after the last respondent. The sample has random selection features. The list of schools was created, and the school e-mails were collected from schools' official sites. The research instruments were distributed to teachers by school principals and professional associates. The Google questionnaire was anonymous and voluntary, filled exclusively by those teachers willing to do it. The structure of the sample by gender, length of service, education, type of school in which teachers work and areas of the subject taught by the teacher is shown in Table 1.

Table 1
Sample Structure

Variables	*f*	%
Gender		
Male	85	23.9
Female	270	76.1
Years of service		
Up to 8 years	39	11
From 9 to 16 years	102	28.7
From 17 to 25 years	125	35.2
More than 25 years	89	25.1
Education		
College	55	15.5
University	178	50.1
Masters	122	34.4
The type of school the teacher works at		
Elementary school	171	48.2
High school	74	20.8
Vocational high school	110	31
The subject area that the teacher teaches		
Science	103	29
Social Sciences and Humanities	252	71

Instrument and Procedures

Scaling and surveys were used in the research, while the instrument was a questionnaire with an assessment scale. The instrument contained questions on demographic characteristics (gender, length of service, teacher education, type of school in which teachers work and the area of the subject taught by the teacher) and five questions that were specifically aimed at personal and professional empowerment of reflective practitioners. The questions in the questionnaire were open and closed, while the Likert-type assessment scale with answer modalities 1 - Strongly disagree; 2 - Disagree 3 – Neither agree nor disagree; 4 - Agree and 5 - Strongly agree (RP-COV-19). Items in the Likert-type assessment scale were divided into four subscales: teachers' perceptions about the importance of personal and professional empowerment; teachers' perceptions on ways of personal and professional empowerment of teachers during a pandemic; teachers' views on the application of the Internet in the personal and professional empowerment of reflective practitioner teachers during a pandemic; the frequency of cooperation with colleagues in order to improve reflective practice during a pandemic. The measuring instrument consisted of a total of 35 items. Scale consistency and reliability were performed by the Cronbach Alpha test and were .67. The measuring instrument was used and constructed only for the purposes of this research and there is no tendency to generalize data to the entire population of teachers.

Data Analysis

A descriptive method was used in the research. In accordance with the set subject and the goal of the research, quantitative research was conducted. Data of the research were analysed through the following statistical parameters: chi-square test (χ^2), correlations (r) and arithmetic mean *(M)* and standard deviation (*SD*). Statistical processing was performed in the package SPSS (Statistical Program for Social Science).

Research Results

As professional empowerment is an important predictor of a high-quality teacher, the results provided information on the commitment to personal and professional empowerment of reflective practitioner teachers during the SARS-CoV2 pandemic.

In order to make sure that the respondents are familiar with the phrase *teacher reflective practitioner*, it was examined which characteristics, from their perspective, should be possessed, namely, by a teacher reflective practitioner.

Table 2

Answers on the Description of a Reflective Practitioner Teacher

	Description of a reflective practitioner teacher			
	A teacher who continuously monitors, innovates, and improves his work	A teacher who reviews his own work and introduces innovations	A teacher who evaluates and revises his own work	∑
Frequencies *(f)*	116	100	139	355
Percentages *(%)*	32.7	28.2	39.2	100

It is explored whether teachers are satisfied with commitment in terms of personal and professional empowerment and whether there is a statistically significant difference between teacher satisfaction with personal commitment and engagement in professional empowerment and training during the pandemic, in terms of gender, length of service and education.

Out of a total of 355 respondents, 158 (44.5%) teachers stated that they were satisfied with their own engagement in the aspect of personal and professional empowerment during the pandemic, 107 (30.1%) were partially satisfied and 90 (25.4%) were dissatisfied with the commitment to empowerment during the pandemic.

Based on the calculated chi-squares, it was shown that there is no statistically significant difference between gender, work experience, education and teacher satisfaction with personal commitment and engagement in professional empowerment and training during the pandemic (Table 3).

Table 3

Differences in Teachers' Perceptions with Personal and Professional Empowerment During the Pandemic in Relation to Gender, Length of Service and Education

		Gender	**Length of service**	**Education**
Teacher satisfaction with personal commitment and engagement in professional empowerment and training during the pandemic	χ^2	3.553	11.700	3.677
	df	2	6	4
	p	.169	.069	.451

Table 4 shows teachers' responses to dissatisfaction with personal and professional empowerment during the pandemic. Teachers critically stated that they were overburdened with the obligations required by online education, lack of motivation for empowerment and improvement, and very poor quality of online webinars and other forms of personal and professional empowerment of educators.

Table 4

Teachers' Responses to Dissatisfaction with Personal and Professional Empowerment during the Pandemic

	Teachers' dissatisfaction with personal and professional empowerment during the pandemic				
	Online webinars and other forms of empowerment are of poor quality	Lack of motivation for empowerment	Overburdened with online teaching obligations	They answered in the affirmative	∑
Frequencies *(f)*	53	57	87	158	355
Percentages *(%)*	14.9	16.1	24.5	44.5	100

Table 5 shows the average answers of the respondents obtained by calculating the arithmetic mean (*M*). Teachers were the least in agreement with the item that they had a wide range of opportunities for professional development during the pandemic ($M = 3.54$), and the highest agreement is present in the first two statements in Table 5 which generally speak of the relevance of professional empowerment for the teaching profession.

Table 5
Personal and Professional Empowerment from a Teacher's Perspective

	M	*SD*
Personal and professional empowerment and improvement is an important factor in creating a successful reflective practitioner teacher.	4.19	1.01
Without personal and professional empowerment, there is no quality teaching work.	4.11	1.06
I believe that teachers had a wide range of opportunities for professional development during the pandemic.	3.54	1.22
The school where I work initiates and encourages professional development of staff.	3.62	1.31
I see the realization of online teaching during the pandemic as personal and professional empowerment.	3.68	130

The most common ways of personal and professional empowerment of teachers during the SARS-CoV2 pandemic was identified. Respondents' agreement was generally mediocre in all allegations of engagement, personal and professional empowerment during a pandemic. According to the item, most of the respondents agreed with the I regularly attended online seminars during the pandemic (*M* = 3.83) and during the pandemic I improved my digital competencies (*M* = 3.90).

Table 6
Forms and Ways of Professional Empowerment from the Teacher's Perspective

	M	*SD*
I regularly attended online seminars during the pandemic.	3.83	1.27
I regularly attended forums and round tables whose topics were aimed at improving teaching.	3.08	1.25
I have participated in online conferences and professional gatherings.	3.53	1.24
I conducted action research to improve work with students.	2.55	1.40
I was doing research work.	2.51	1.46
I have published articles in scientific and other journals.	2.17	1.42
I regularly read the results of domestic and foreign scientific research.	3.01	1.41
I organized online trainings during the pandemic.	2.63	1.41
I used all the online opportunities for professional empowerment during the pandemic.	3.60	1.38
During the pandemic, I improved my digital competencies.	3.90	1.34

Starting from the fact that the Internet is indispensable in the work of teachers today, with this research task we tried to examine the extent to which the use of the Internet is represented in personal and professional empowerment of reflective practitioners during the pandemic (Table 7). The response rate of respondents is generally very positive and high, the only slightly lower agreement with the items is *I searched domestic and foreign portals that show examples of good practice in the implementation of online teaching* (*M* = 4.09).

Table 7
Application of the Internet in Personal and Professional Empowerment from the Teacher's Perspective during a Pandemic

	M	*SD*
I regularly use the Internet as one of the sources of professional empowerment.	4.42	0.81
I am willing to use the Internet and expand my personal and professional competencies through it.	4.46	0.80
The Internet was suitable as a training opportunity during the pandemic.	4.40	0.79
I used the Internet before the pandemic as a way of professional empowerment.	4.41	0.84
I used the benefits of the Internet and online education.	4.40	0.83
On my own initiative, I searched the Internet for trainings where I can improve my teaching work.	4.20	1.01
I searched domestic and foreign portals that show examples of good practice in the implementation of online teaching.	4.09	1.11
I use the Internet as a source of ideas to improve online teaching during a pandemic.	4.32	0.90
I use the Internet to search for literature related to educational work.	4.17	1.03

Guided by the fact that cooperation with colleagues is very important in terms of professional empowerment and improvement of reflective teaching, it was examined the frequency of cooperation with colleagues in order to improve reflective practice during the pandemic. Very low consent of the respondents is present in the items *I attended online classes of colleagues from the school where I work* (*M* = 2.04) and *I attended online classes of colleagues from other schools* (*M* = 2.13), while the highest agreement is in the spectrum of these claims represented in the item, *I exchange experiences with colleagues from the school where I work* (*M* = 4.03).

Table 8
Cooperation with Colleagues in Order to Improve Reflective Practice - Perspective of Teachers

	M	*SD*
I attended online classes of colleagues from the school where I work.	2.04	1.30
I attended online classes of colleagues from other schools.	2.13	1.41
I applied the ideas of colleagues that proved to be examples of good practice.	3.65	1.07
I share experiences with colleagues from the school where I work.	4.03	0.84
I exchange ideas and experiences with colleagues from other schools.	3.50	1.16
I talk to colleagues and professional associates about how to improve work during a pandemic.	3.86	1.07

With the last research task, we wanted to investigate how teachers would assess their personal and professional empowerment and engagement during a pandemic. Teachers were offered 5-point Likert scale intervals on which they could do their own work and engage grades with grades 1, 2, 3, 4 and 5.

None of the respondents rated their own work with a grade of one, 46 (13%) with a grade of two, 88 (24.8%) with a grade of three, a grade of three four 126 (35.5%) teachers and 95 (26.8%) teachers with a grade of five.

The results presented in Table 9 show that there is a positive and weak correlation between the gender of teachers and the assessment of their own work and engagement during the pandemic (r = .14; p = .008). Female teachers assessed the more frequent personal and professional empowerment during the pandemic with a score of four and five. There is a positive correlation between education and teacher assessment (r = .31; p = .0001). There is a weak and negative correlation between the type of school in which teachers work and teachers' assessments of personal and professional empowerment (r = - .13; p = .018).

Table 9

Correlation in Terms of Teachers' Grades during the Pandemic and Gender, Education, and Type of School in which Teachers Work

	Variables	***r***	***p***
Teachers' assessment of personal and professional empowerment and engagement during the pandemic	Gender	.14	.008
	Education	.31	.0001
	The type of school the teachers work at	-.13	.018

Discussion

For many teachers, education during the pandemic was a real challenge. The crisis caused by the pandemic caused by the SARS-CoV2 virus also affected teacher education (Spagnolo et al., 2021). In addition to the many difficulties of conducting online teaching and distance learning, teachers were expected to continually review their work and improve their teaching practice. As this is not effective without personal and professional empowerment, with this research we wanted to contribute to the personal and professional empowerment of reflective practitioner teachers.

The question arises as to what qualities a reflective practitioner should possess and represent? “A teacher who thinks about his practice is characterized by: a tendency towards continuous self-analysis and self-monitoring; sensitivity to perceive the situation from different angles; searching for elements of good practice; openness to try different ways of working than usual; openness to share experiences with colleagues; willingness to change the previously set plan on the spot depending on the way students react during class; readiness to analyse the beliefs on which his daily actions are based” (Radišić et al., 2015, p. 9). According to the above, the reflective practitioner teacher critically reviews and interprets his/her own work, analyses and introduces novelties that improve everyday teaching practice.

The results of the research show that all teachers described the reflective practitioner teacher well, which tells us that teachers are familiar with this phrase, which is increasingly present in the pedagogical literature. The fact that more than half of the teachers pointed out that they were partially or not at all satisfied with personal and professional empowerment during the pandemic is worrying. The results show that there is no statistically significant difference between gender variability, length of service, education and teacher satisfaction with personal commitment and engagement in professional empowerment and training during the pandemic. Their reasons for dissatisfaction are the high workload based on organization and conducting online classes, the lack of motivation to dedicate to personal and professional empowerment and the poor quality of online webinars, seminars and other forms of empowerment were of poor quality. It was noticed that the dissatisfaction of teachers is accompanied by great difficulties that they faced every day in their professional work and strengthening their competencies. Respondents generally agree with the items that concerned general personal and professional empowerment, while the average agreement with the items on the possibilities of professional empowerment during the pandemic, support, and initiation of a school for professional empowerment of staff and to perceive the realization of online teaching as professional and personal empowerment, strengthening and improving their work.

When it comes to forms of teacher empowerment during the pandemic, the following forms are least present: publishing articles in scientific journals, conducting research work, conducting action research, and organizing online education during the pandemic. The most common form of empowerment is attending online seminars during a pandemic. The results of research (Pavlović-Breneselović & Krnjaja, 2012) whose sample was composed of educators, shows that the most dominant form of professional development are seminars.

Teachers had positive perceptions with items about the use of the Internet in personal and professional empowerment. Therefore, the use of the Internet in the development of competencies and the aspect of professional empowerment of reflective practitioner teachers during the pandemic proved to be an important element. Visiting colleagues' online classes was not a common activity among teachers during the pandemic, while sharing experiences with colleagues was more common. Also, the results of the research (Džinović et al., 2013) show that the attendance of other colleagues' classes measures a very low score. As no tangent research has been found that deals with the empowerment of reflective practitioner teachers during a pandemic, efforts have been made to look at and show how reflective practitioner teachers are personally and professionally empowered in pandemic conditions.

Conclusions and Implications

Reconsideration and revision of practice, as well as the desire to prove one's own success through outcomes in student achievement, characterizes the teacher as a reflective practitioner. Loyalty to the profession includes the inevitable form of personal and professional empowerment of teachers. The results of research show divided perceptions of teachers about personal and professional empowerment during a pandemic. Therefore, although all teachers positively described and recognized the characteristics of reflective practitioners, it can’t be said that all of them in the part of professional empowerment during the pandemic acted in accordance with reflective principles.

This research was conducted with the aim of reviewing the personal and professional empowerment of reflective practitioner teachers during the SARS-CoV2 virus pandemic. Taking into account the pandemic crisis and the inexperience of teachers in the concept of distance learning, it is concluded that the new situation, accompanied by concern and patience, has affected teachers' commitment to personal and professional empowerment and strengthening their own competencies. Perceptions of the importance of professional development and empowerment are positive in terms of the importance of training and empowerment, attending online seminars and improving digital competencies, using the Internet, and exchanging experiences with colleagues at the school where they work. Most teachers rated their personal and professional empowerment and engagement during the pandemic with the highest marks (four and five), while there were no negative marks at all.

In order to meet the requirements of education, teachers must give great personal and professional empowerment and include self-reflection in their work because today high-quality teachers are considered to be reflective practitioners. The presented research with its findings indicates possible research limitations in terms of research findings because they cannot be generalized to the perceptions of all teachers in the Republic of Serbia and other countries. However, this research can certainly encourage teachers to think in order to improve educational practice, because that is the quality of every reflective practitioner. On the other hand, it can be a good incentive for all researchers who want to deal with this issue, further improve it and repeat this study in some other conditions in order to see a more complete picture of a reflective practitioner teacher during a pandemic. Certainly, the findings can be postulates for some future futurological and comparative research.

Declaration of Interest

Authors declare no competing interest.

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Appendix

QUESTIONNAIRE WITH ASSESSMENT SCALE ON PERSONAL AND PROFESSIONAL EMPOWERMENT OF REFLECTIVE PRACTITIONER TEACHERS DURING THE PANDEMIC (RP-COV-19)

Respected teachers,

The questionnaire in front of you collects information on commitment to personal and professional empowerment as an important factor in improving the work of reflective practitioner teachers. In order to achieve the goal of the research, your opinion is of special importance. Please answer each question honestly.

Thank you for your cooperation!

Gender: a) male; b) female.
Indicate the total length of service in the teaching profession: ______
Professional qualifications: a) College; b) University; c) Master.
The type of school I work at: a) elementary school; b) high school; c) vocational high school.
The subject area that I teach: _________________________

1. How would you describe a reflective practitioner teacher?
   ____
   ____
   ____
2. Are you satisfied with your personal commitment and engagement in professional empowerment and training during the pandemic?
   a) I'm satisfied. b) I'm partially satisfied; c) I'm not satisfied.

3. If you are not satisfied with your personal commitment and engagement in professional empowerment and training during the pandemic, give reasons:
____
____
____

4. How would you rate (1 to 5) your personal and professional empowerment and training during the pandemic??
a) one; b) two; c) three; d) four; e) five.

5. In front of you is a series of offered claims about the personal and professional empowerment of a reflective practitioner teacher. Your task is to state the degree of agreement or disagreement with each statement, i.e., to mark with X an answer for each statement in the appropriate column.

Statements	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**
Personal and professional empowerment and improvement is an important factor in creating a successful reflective practitioner teacher.					
Without personal and professional empowerment, there is no quality teaching work.					
I believe that teachers had a wide range of opportunities for professional development during the pandemic.					
The school where I work initiates and encourages professional development of staff.					
I see the realization of online teaching during the pandemic as personal and professional empowerment.					
I regularly attended online seminars during the pandemic.					
I regularly attended forums and round tables whose topics were aimed at improving teaching.					
I have participated in online conferences and professional gatherings.					
I conducted action research to improve work with students.					

I was doing research work.					
I have published articles in scientific and other journals.					
I regularly read the results of domestic and foreign scientific research.					
I organized online trainings during the pandemic.					
I used all the online opportunities for professional empowerment during the pandemic.					
During the pandemic, I improved my digital competencies.					
I regularly use the Internet as one of the sources of professional empowerment.					
I am willing to use the Internet and expand my personal and professional competencies through it.					
The Internet was suitable as a training opportunity during the pandemic.					
I used the Internet before the pandemic as a way of professional empowerment.					
I used the benefits of the Internet and online education.					
On my own initiative, I searched the Internet for trainings where I can improve my teaching work.					
I searched domestic and foreign portals that show examples of good practice in the implementation of online teaching.					
I use the Internet as a source of ideas to improve online teaching during a pandemic.					

I use the Internet to search for literature related to educational work.					
I attended online classes of colleagues from the school where I work.					
I attended online classes of colleagues from other schools.					
I applied the ideas of colleagues that proved to be examples of good practice.					
I share experiences with colleagues from the school where I work.					
I exchange ideas and experiences with colleagues from other schools.					
I talk to colleagues and professional associates about how to improve work during a pandemic.					

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